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MISSISSIPPI'S FOREST RESOURCES *and* INDUSTRIES

FOREST SERVICE
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Forest Resource Report No. 4

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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST RESOURCE REPORT NO. 4 WASHINGTON, D. C., 1951

Mississippi's Forest Resources and Industries

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SOUTHERN FOREST EXPERIMENT STATION

UNITED STATES GOVERNMENT PRINTING OFFICE • WASHINGTON • 1951

FOR SALE BY THE SUPERINTENDENT OF DOCUMENTS, WASHINGTON 25, D. C., PRICE 50 CENTS

Preface

FORESTS are one of the Nation's most valuable natural resources. To sustain and increase this resource requires accurate knowledge of forest conditions. This need was recognized by the Congress of the United States when it authorized the Nation-wide Forest Survey through the McSweeney-McNary Forest Research Act of May 22, 1928.

The Nation-wide Forest Survey has a fivefold purpose: (1) To take inventory of the supply of standing timber and other forest products; (2) to ascertain the rate at which this supply is being increased through growth; (3) to determine the rate at which this supply is being diminished through use, and by fire, insects, disease, and other agencies; (4) to estimate the present requirements and the probable future trend in the requirements for timber and other forest products; and (5) to correlate these findings with existing and anticipated economic conditions, in order that policies may be formulated for the effective use of lands suitable for forest production.

This report on the forests of Mississippi is concerned chiefly with the timber resource of the State. It recognizes, however, that Mississippi's forests also have tremendous value in the protection of watersheds, in lessening damage from soil erosion, in providing recreation and a habitat for wildlife, and in furnishing range forage for livestock. The report is primarily the product of the new Forest Survey of the State, which was made between 1946 and 1948 in cooperation with the Mississippi State Forest Service; but it also draws on the first Forest Survey, which was carried out in 1932–35.

The 14 years that elapsed between the two Forest Surveys were eventful years. The United States fought a war. Mississippi saw some of the worst depression and some of the highest prosperity in its history. These extremes in general business were reflected in wide changes in the rate of use of standing timber. The character of the wood-using industries changed markedly. In lumber, there was a continued shift toward smaller operations. In pulpwood, there was a fivefold increase in production as the State joined in the huge enlargement of the pulp and paper industry in the South. During these 14 years, Mississippi saw a greater interest in good forest management than at any previous time, and greater activity in forestry extension work and research. Large acreages of forest land were acquired by companies which recognized the possibility of growing timber as a crop. The State legislature passed a timber harvesting act and voted increased funds for forest-fire protection.

What has happened to the forests of Mississippi during these momentous years? What role have forest landowners played in the changes which have occurred in the timber resource? How have the wood-using industries adjusted to the changing resource and what are their prospects for timber raw material in the future? What solutions to the problems are suggested by the findings of the Forest Survey? These are some of the questions which this report attempts to answer.

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Summary

Timber-products industries rank just behind farming as one of the two major parts of Mississippi's economy.

Nearly one dollar out of every four dollars of income received from private enterprise by the 2,100,000 people in the State comes directly from timber products. In 1946 the value of raw timber products was $122 million; further manufacture within the State added $130 million in value.

Direct employment in the harvesting and manufacture of timber products totals some 68,000 man-years annually.

Forest acreage increased 2 percent during the 14 years between the two Forest Surveys, but timber volume, quality, and size declined in most respects.

Sawlog volume dropped a fourth in the whole State. South Mississippi gained 3 percent; north Mississippi lost 40 percent; central Mississippi, 25 percent; the Delta, 29 percent. Volume of total growing stock dropped about 10 percent; hardwoods did not change, but softwood fell off 20 percent.

Nearly two-thirds of the sawlog timber is of grade 3 quality. One out of every four trees in the forest of cordwood or larger size is a cull.

Pine forests have been converted to hardwood forests on 2.2 million acres.

Numbers of softwood trees under 8 inches d. b. h. increased; in all larger sizes, the numbers decreased. Hardwoods increased up through 14 inches d. b. h., but declined in all larger sizes.

Use of the forest continues heavy. Despite declines in some items, the total output of products has been sustained for about three decades. This has been done mainly by overcutting the forest; by using smaller trees, poorer quality trees, and less desired species than were formerly taken; and by expanding the output of less exacting products, particularly pulpwood.

The 1946 volume of all timber products in the round or split piece was 473 million cubic feet—239 million in hardwood, 234 million in softwood.

More than a fourth of the sawlog output in the past 14 years has been cut at the expense of timber growing stock.

Logging for pine on the average sawlog operation removes nearly all trees over 12 inches d. b. h., and almost three-fourths of the volume in 10- and 12-inch trees. Pulpwood logging takes three-fourths of the pine volume in 6- and 8-inch trees.

Logging for hardwood on the average sawlog operation removes nearly all grade 1 timber, two-thirds of the grade 2, and less than half the grade 3.

Management on the 90 percent of the forest in private ownership is generally poor, although most of the large industrial holdings and some of the smaller properties are under good management.

Little more than a fourth of the forest held by Mississippi's 146,000 private forest landowners rates fair or better in respect to management practices; nearly three-fourths rates poor or worse.

Unsupervised cutting occurs on more than half the private forest.

Owners of a tenth of the private forest install structures or equipment to aid in stopping woods fires. Despite recent gains, State fire protection is still extended to only 51 counties out of 82.

Owners of close to half the private forest do not understand what timber management involves; most of them do not recognize that their timber management could be improved.

The present outlook is for contraction in some of Mississippi's important wood-using industries unless timber management improves rapidly.

The prospect is that softwood lumber, standard hardwood factory lumber, veneer, and tight cooperage will be hit hardest, although softwood pulpwood and other products may also be forced into decline.

Better timber management can eventually create a productive resource and prosperous forest economy.

A growth goal of 800 million cubic feet of all timber per year, including 3 billion board feet of saw timber, would meet Mississippi's needs and enable the State to contribute its share toward meeting national timber requirements. The goal calls for a 50-percent increase in cubic-foot growth, a 65-percent increase in board-foot growth.

The situation calls for drastic improvements in timber management now.

Landowners, woodusers, and the public all have a heavy stake in improving Mississippi's forest situation. All three groups can take action to accomplish the following principal measures:

Cutting practice.—Follow silvicultural principles in logging to keep stands productive. Provide for effective supervision of logging.

Timber utilization.—Use less desired species and poorer quality trees. Log more pulpwood, fuel wood, and other small products as thinnings or improvement cuts rather than as harvest cuts. Integrate logging to utilize different parts of the tree for different products.

Fire.—Raise current standards of fire protection and extend protection to the whole State.

Grazing.—Extend grazing protection to south Mississippi; intensify protection in other parts of the State.

Mississippi: The Setting[1]

Among Mississippi's natural resources, forests are a close second to crop and pasture land as the primary source of income. Occupying more than half of all the land in the State, the second-growth pine and hardwood forests are the mainstay of numerous Mississippi communities. No resident of the State is unaffected by the many benefits which flow from the forests.

Forest Survey Regions

Four regions—north, central, south, and Delta—have been recognized by the Forest Survey in Mississippi (fig. 1). They have been distinguished primarily on the basis of forest types and economic conditions, although their boundaries follow county lines for convenience in compiling data. The regions also conform, to some extent, to the major physiographic areas of the State (fig. 2).

Except for a narrow strip of the Bluff and Brown Loam area included within its boundaries, the Delta Region is entirely within the alluvial plain of the Mississippi River. It contains some very fertile alluvial deposits, 35 feet deep in places, and supports a rich cotton agriculture (fig. 3). However, recurrent flooding and inadequate drainage, especially in the extensive backwater areas of the Mississippi and Yazoo Rivers above Vicksburg, limit the extent to which the land can be tilled. Much of the land has never been cleared, and many fields laboriously claimed from the forest on poor farming soils have been allowed to revert to trees again. Despite the enthusiasm of the Delta for cotton, more than a third of the land is still forested.

South Mississippi also lies almost entirely within a single physiographic area—in this instance, the Piney Woods (known also as the longleaf pine area) comprising level to gently rolling lands of the lower Coastal Plain (fig. 4). The sandy soils of the Piney Woods never stimulated widespread agriculture. People did not move into the region in large numbers until heavy timber exploitation began at the end of the 19th century. As the original forest was cut down, many stayed for subsistence farming, but even today, after a large recent expansion in specialty crops and livestock, only one acre out of six is cropland or open pasture. More than three-fourths of the land remains forest land, although in some places where the forest is heavily grazed, livestock rivals timber as a forest product.

Central Mississippi is characterized mainly by the Central Hills and the lower half of the Bluff and Brown Loam area, although it contains also a narrow strip of the Mississippi alluvial plain, and parts of the Piney Woods, the Prairies, and the Flatwoods areas (fig. 5). The Bluff and Brown Loam area is a belt some 20 to 40 miles wide fronting the Delta. Its loessial soil is piled high in the rugged Bluff hills alongside the Delta, in places as much as 90 feet deep; but it thins out in the rolling hills to the east and disappears in a broad zone of thin, scattered remnants overlying the Coastal Plain.

The Bluff and Brown Loam area once produced luxuriant crops, but severe gully erosion made large areas impossible to cultivate and caused their abandonment. The Central Hills is an area of low hills and small farms. Its characteristic soil is a fertile silt-clay

[1] Historical material in this section is drawn largely from the following sources: (1) Federal Writers' Project. Mississippi, a guide to the magnolia state. 545 pp., illus. New York. 1938. (2) Sargent, Charles S., report on the forests of north america. U. S. Census Office, Dept. of the Interior. 1884. (3) Hilgard, Eugene W., report on cotton production in the united states, part 1. U. S. Census Office, Dept. of the Interior. 1884. (4) Various other Census reports, particularly the tenth census of the united states, 1880.

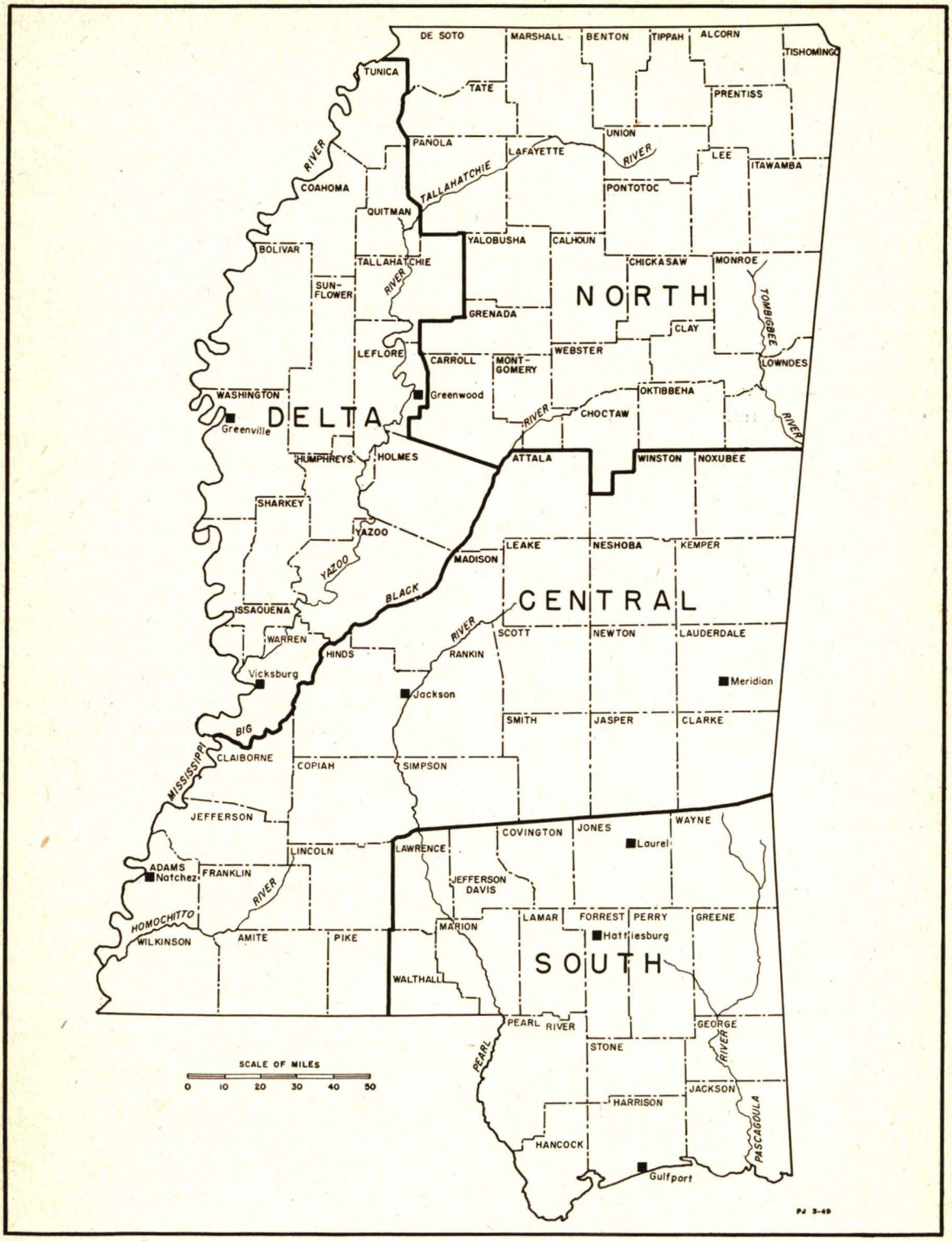

FIGURE 1.—*Forest Survey regions in Mississippi.*

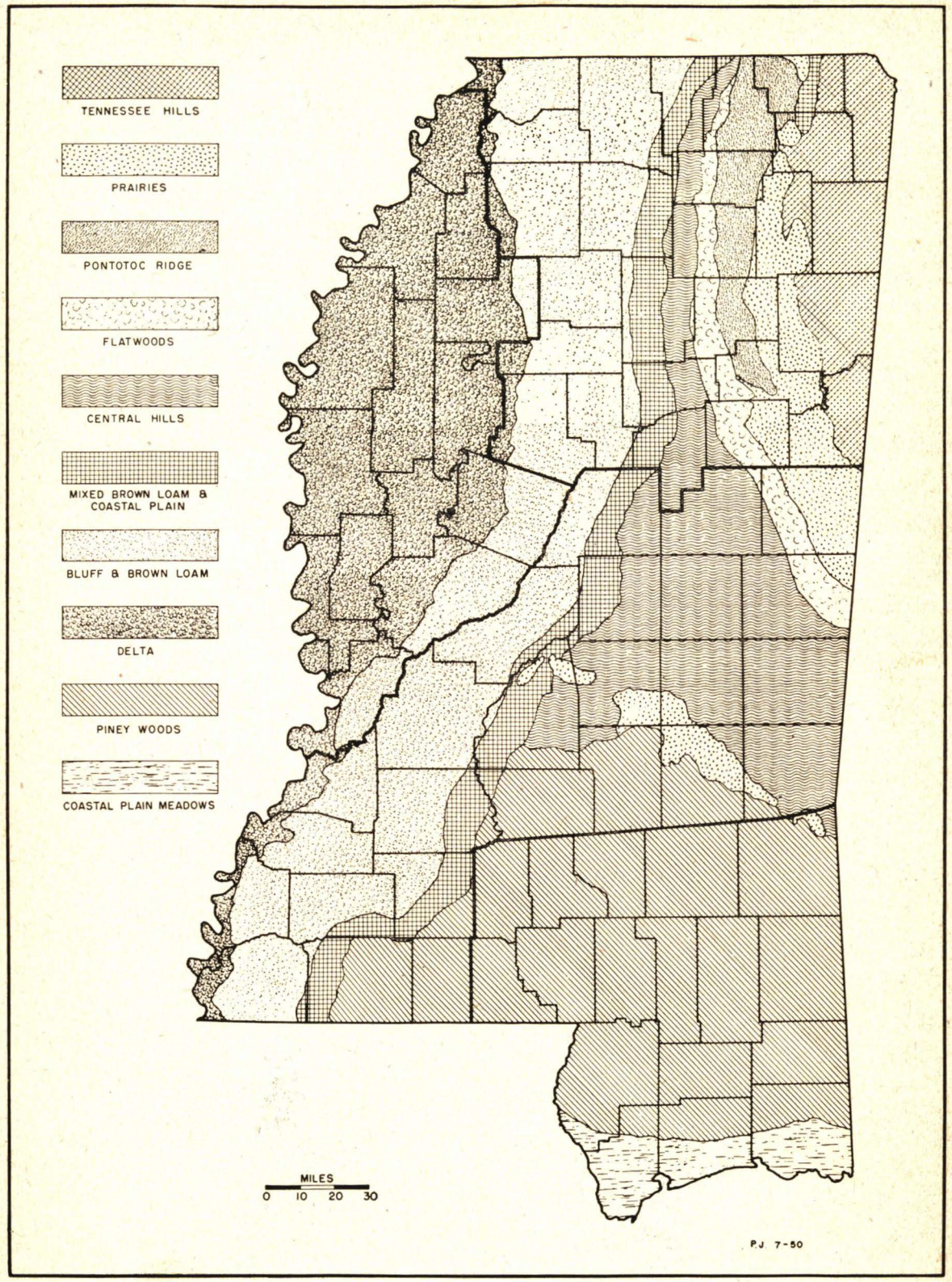

FIGURE 2.—*Physiographic areas in Mississippi.* (*Source: Soil map of Mississippi, State Department of Agriculture, Jackson, 1942.*)

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FIGURE 3.—*Although extensive backwater areas are still forested, the Delta is characterized by its broad expanses of rich cotton fields.*

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FIGURE 4.—*Scattered, young pine stands combined with dense native grasses and grazing cattle are common features of the Piney Woods region.*

loam, but the long history of erosion associated with cotton culture has consumed much of the fertility of the land.

The Survey region termed north Mississippi contains a variety of physiographic areas extending north and south in roughly parallel strips (fig. 6). There is the Mississippi Delta, the Bluff and Brown Loam area, and the Central Hills, all of which were noted previously in other Survey regions. To the east, there are the Flatwoods, the Pontotoc Ridge, the Prairie, and the Tennessee Hills.

The Flatwoods is a flat, poorly drained area. Its soil is uniformly gray sticky clay that retains water tenaciously. It is difficult to cultivate, and most of the area is still forested. The soil of the Pontotoc Ridge was originally a rich sandy loam that was extensively cultivated, but as a result of severe erosion much land has been abandoned and allowed to revert to forest. The Prairie, a comparatively treeless, rolling plateau with fertile soil, has a well developed dairy industry. The Tennessee Hills have long been settled, but the steep slopes and coarse soils never permitted a highly developed agriculture. Except for the stream bottoms and the lower hills near the Prairie, the Tennessee Hills are heavily wooded.

The Original Forests

In colonial times, Mississippi was heavily forested. A great longleaf pine forest extended inland from the coast covering the rolling hills of the entire Piney Woods area and reaching into the brown loam soils on the west. In mixture with various hardwoods, mostly oaks, the longleaf belt extended into the Central Hills as far north as Kemper County. Beyond the longleaf pine, a forest of shortleaf pine in varying mixture with hardwoods (mainly red oaks, and also hickories, black gum, and chestnut) extended north through the large areas comprising the Central Hills and into the southern half of the Flatwoods. A similar

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FIGURE 5.—*Central Mississippi is typified by a gently rolling terrain and a pattern of interspersed fields and pine-hardwood forest.*

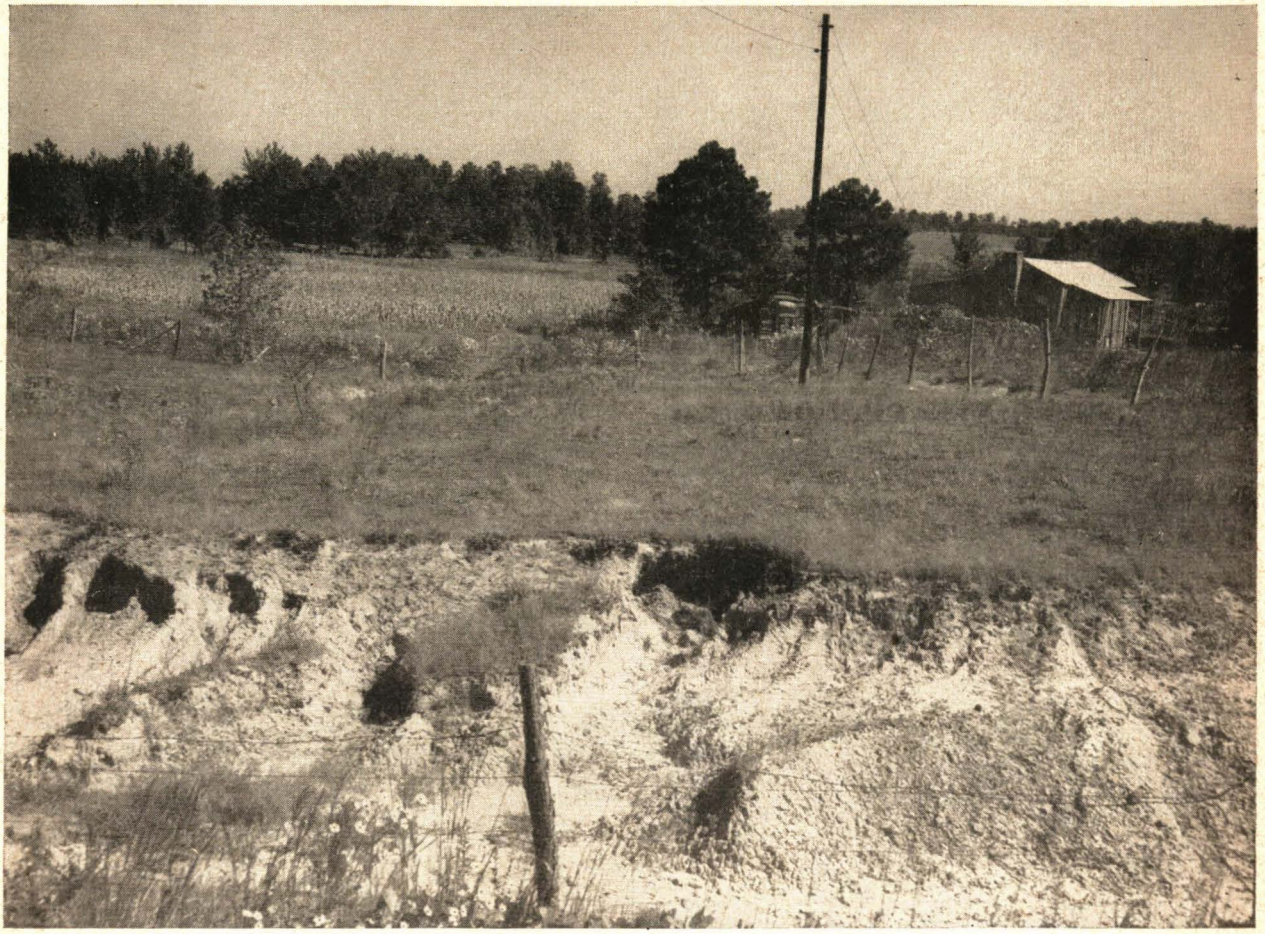

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FIGURE 6.—*Eroded soils, small farms, and poor woodlands mark much of the north Mississippi landscape.*

forest covered the rugged Tennessee Hills in the northeastern corner of the State. Loblolly and slash pines also occurred in the original forests of Mississippi, but apparently their occurrence was scattered. In no place did they form large, unbroken, pure stands.

Elsewhere in the State—the entire Delta, most of the brown loam areas, the Pontotoc Ridge, the northern half of the Flatwoods, and the stream bottoms everywhere—hardwood forests dominated the scene. In 1884, in his Report on the Forests of North America, Charles S. Sargent quoted Dr. Charles Mohr as follows concerning the Delta:

> Along the elevated ridges fronting the streams the white oak, the willow oak, the shell-bark and mocker-nut hickories, the black walnut in great numbers, the yellow poplar and sassafras large enough to furnish canoes of great size, the mulberry, the Spanish oak, the sweet and black gums are the principal forest trees. . . . In the forests covering the lower lands . . . the cow oak takes the place of the white oak, while the over-cup white oak occurs everywhere. . . . Here the sweet gum reaches its greatest size, and here grow also in great perfection the bitter-nut, the elms, hornbeams, white ash, box-elder, and red maples of enormous size. The honey locust, water oaks, and red and Spanish oaks are equally common.

Some of the details of this description may be open to question, but the over-all impression of timber abundance, variety of species, and large tree size is undoubtedly sound. The original forests in the bottom lands throughout the State were often similar to those in the Delta.

On the loessial bluffs fronting the Delta, the forest was mainly oaks—white, chestnut, black, and some cherrybark and shumard—with hickory, sweet and black gum, basswood, elm, sassafras, yellow-poplar, magnolia, and beech. To the east, the forest on the brown loam soils graded into an oak-hickory forest; and the southern part of the brown loam area con-

tained a substantial mixture of pines. The oak-hickory forest also covered the Pontotoc Ridge and the northern half of the Flatwoods.

Agriculture and the Forests

Early settlement was on the edges of the State, along the coast and in the Bluff hills around Natchez. But the real opening of the State came with the cotton boom which began around 1800. First, southwestern Mississippi was marked off and tilled, then the Pearl and Tombigbee River valleys. After the land boom of the 1830's and the development of railroad and steamboat routes, cotton farmers moved into the northern and central uplands (fig. 7).

By 1850 more than 3 million acres of forest had been cleared for cultivation and pasture, and population had passed the 600,000 mark. In 1860, cleared acreage exceeded 5 million acres. It dropped drastically during and after the Civil War, but recovered to 5.2 million acres in 1880. In the latter year, extensive cultivation occurred in all parts of the State except the Piney Woods. The Delta already had 16 percent of the cotton acreage, an indication that the movement of farmers from the central and northern hills was well under way.

It was erosion of the upland farms that forced the large-scale opening of the Delta to cotton. There were considerable obstacles to clearing the forest and draining Delta land, and in protecting plantations against flooding, but a large part of the Delta was converted by hard labor into productive fields. The rich cotton agriculture which developed has continued to the present day.

Hill-land erosion had become a serious problem in the early years of cotton cultivation. Particularly in the fertile brown loam uplands of the State, erosion took an extremely heavy toll (fig. 8). Hundreds of thousands of acres of once good hill land were washed, dissected by gullies, and ruined for further cropping. As early as 1850—according to Mississippi, a Guide to the Magnolia State—Eugene Hilgard, the first State geologist, wrote about the northern part of the State as follows: "Even the present generation is rife with complaints about the exhaustion of soils—in a region, which, 30 years ago, had just received the first scratch of the plowshare."

The abandonment of upland fields which followed on the heels of soil erosion was intensified around the turn of the century by the boll weevil plague and, later, by the loss of world cotton markets. Thus, throughout the history of upland farming in Mississippi, which is largely the story of cotton production, land has been cleared for cultivation, then abandoned to revert to forest.

When fields which had originally been claimed from mixed pine-hardwood stands were abandoned, they usually seeded in to pure pine stands. This process was recognized as early as 1880 by Dr. Charles Mohr, according to Charles S. Sargent's Report on the For-

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Figure 7.—*The history of upland farming in Mississippi is largely the story of cotton production.*

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FIGURE 8.—*Erosion, which has taken a heavy toll of Mississippi soils for more than a century, often assumes dramatic form in the brown loam soils.*

ests of North America. He quoted Mohr as saying that in southern Mississippi "the old clearings are covered with fine loblolly pine, from 40 to 60 feet high." In the Central Hills, "the second forest growth in the northern part of this region consists almost exclusively of the short-leaved pine, which southward is associated with loblolly pine." The process of abandoning farm fields and allowing them to revert to forest is still going on.

Increasingly, the farmer sees that cotton has been too hard a taskmaster, although he has frequently been slow to recognize timber as a valuable farm crop. The narrow belt of land that extends south of Jackson, between the Piney Woods and the Bluff hills, was converted to truck farming many years ago. The Prairie sections never abandoned cotton, but supplemented it with legumes, other cover crops, and dairying.

Over the State as a whole, there has been a broad movement to livestock products. From 1930 to 1945, pasture was extended 66 percent to 4.2 million acres, while cropland acreage declined 5 percent to 6.6 million acres. During this same period the value of livestock products sold rose from 10 percent of all farm products sold to 16 percent. However, this is a trend, not yet a revolution. Crops still provide the large bulk of farm cash income, and cotton dominates the crops (it made up 80 percent of the total cash income from crops in 1946).

Farm woodlands have persisted in producing successive crops of timber in spite of widespread neglect and abuse, and through their persistence, have forced themselves on the attention of farm landowners (fig. 9). Rising stumpage values, large cash returns from timber sales, and the realization that successive timber crops can be grown is causing a reorientation in the thinking of some farmers. Although farmers who appreciate timber as an important crop are all too few, their number is increasing.

The Timber Economy

During the nineteenth century, timber was used widely as fuel and building material on the farms and in the towns, but the forest did not yield a large volume of commercial products. In 1879, the cut of pine (three-fourths of the total sawlog volume cut) in Mississippi was 125 million board feet. Commercial pine logging up to this date had been restricted to a small area in the northeast corner of the State, a narrow strip along the Illinois Central railroad extending from the Louisiana border to just south of Jackson, and strips along the major streams in the longleaf pine belt of south Mississippi.

With the exhaustion of the main pineries in the Lake States late in the century, national markets for southern pine opened up. After 1900, the big burst of lumbering activity in Mississippi's virgin pine forest got under way. It was a mining operation—but it gave work to thousands. It built railroads, and towns like Hattiesburg and Laurel. By 1925, the peak year of lumber production, some 40,000 workers were employed in timber industries, more than two-thirds of the labor employed by all industry in the State.

When the virgin timber was leveled, the large mills were shut down or moved out of the State. But on much of the cut-over pine lands, new forests arose,

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FIGURE 9.—*Soils that produce poor farm crops are often capable of growing good stands of timber.*

although they were frequently slow in making their appearance and the pine did not come in as extensively as in the old growth. Moreover, as described earlier, new pine forests had been growing up on abandoned fields over much of the uplands. In quality and volume, these new forests were no match for the old forests, but they were acquiring the value which comes from scarcity and new uses. They provided raw material for hundreds of small, portable sawmills and for that new giant of southern industry, the wood pulp mills.

In 1946 the value of raw timber products both for domestic use and for sale (logs, bolts, and other round or split products, and also gum and wood naval stores) in Mississippi was $122 million. Further manufacture of these products within the State added $130 million in value (fig. 10). In terms of income payments to the 2,100,000 people of Mississippi, this value of $252 million is reduced to some $202 million,[2] 23 percent of the total income in the State from all sources except government.

Income payments to people of Mississippi from private enterprise, 1946

Source: [1]	*Million dollars*	*Percent*
Trades and services	288	33
Agriculture	270	30
Timber products	202	23
Other manufactures and miscellaneous sources	128	14
Total	888	100

[1] Total income payments and income payments from trades and services and agriculture, from SURVEY OF CURRENT BUSINESS, U. S. Bur. For. and Dom. Commerce, Aug. 1947. Income from timber products derived from calculated value of raw timber products and value added by manufacture. Income from other manufactures and miscellaneous sources is a residual between total income payments and all other items listed.

Timber products are thus seen to be one of the pillars of Mississippi's economy. They rank as a source of income not far behind farming and well ahead of all other manufactures, minerals, fisheries, and miscellaneous forms of income.

How many workers find employment in forest industry cannot be estimated with accuracy, since much of the employment is part-time work for farmers. But in terms of full employment (fifty 40-hour weeks a year), Mississippi's forest industry provides about

[2] An estimated $22 million worth of fuel wood and other timber products is used on the farm but is never sold. In addition, an estimated $28 million is credited to nontimber sources of income or flows as profit to people outside the State.

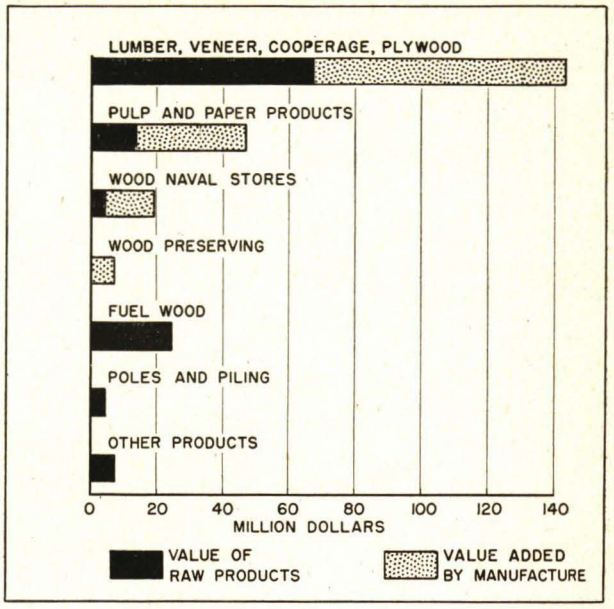

FIGURE 10.—*Value of raw timber products and value added by manufacture, 1946.*

68,000 man-years of employment—35,000 in cutting products and hauling them to mills, and 33,000 in manufacture (table 1).

NONTIMBER VALUES OF THE FOREST

Throughout this report, emphasis is on the forest as a source of timber. Other forest uses, however, may, in the aggregate, have an even greater value. These are watershed protection, grazing, recreation, and wildlife protection. Usually several of these uses can be combined successfully with commercial timber production on the same area without seriously depleting the growing stock or the soil.

TABLE 1.—*Employment* [1] *in Mississippi's forest industry, 1946*

[Thousand man-years; i. e., 000 omitted]

Industry or commodity	Total	In the woods	At the mill
Lumber and lumber products	33.0	12.1	20.9
Pulp and paper	10.9	6.2	4.7
Veneer, plywood, and cooperage	7.0	2.4	4.6
Naval stores	3.8	2.1	1.7
Wood preserving	1.0	0	1.0
Poles and piling	1.9	1.9	0
Hewn ties	1.7	1.7	0
Fuel wood and other farm use	8.8	8.8	0
Total	68.1	35.2	32.9

[1] Fifty 40-hour weeks per year.

Perhaps the greatest of the nontimber services of the forest is in watershed protection—lessening erosion, reducing rapid storm runoff and resulting floods, and maintaining high levels of ground water for wells and springs. Recurring fires and severe cutting reduce the watershed value of much of the forest, yet the protective value of what remains is important though incalculable. As an example of what improved watershed conditions might mean, the U. S. Department of Agriculture estimated that its proposed flood-control program for the Yazoo River watershed—a program which could be expected to restore much of the watershed-control functions of the forest—would reduce annual flood and sedimentation damage more than half.[3]

Forest grazing is widespread throughout the State, particularly in south Mississippi, where the forest is open and the forage, mainly perennial grasses, is abundant and fairly tender and nutritious in the spring. Good livestock management might lessen the reliance placed by farmers on the wild forage of the forest, but as livestock management is now practiced with year long range grazing, Mississippi's forest land furnishes perhaps half of the total food consumed by livestock in the State—about three-fourths in south Mississippi and lesser amounts in other parts of the State. The importance of this forage contribution in 1948 can be judged from the number of cattle, hogs, sheep, and goats in the State (2.7 million animals) and their value ($124.8 million).

The forest offers a much sought environment for recreation. Recreational facilities are provided in 10 State parks, numerous park areas in the national forests, and the Natchez Trace Parkway. Wildlife, much of it dependent on the forest for its habitat, is at only a fraction of its potential population, yet recent numbers of licensed hunters and fishermen approach 180,000 a year. Their expenditures in pursuing their sport are estimated at more than $5 million annually.

[3] U. S. Dept. Agr. SURVEY OF THE YAZOO RIVER WATERSHED IN MISSISSIPPI. House Doc. 564, 78th Cong., 2d Sess. 58 pp., Illus. 1944.

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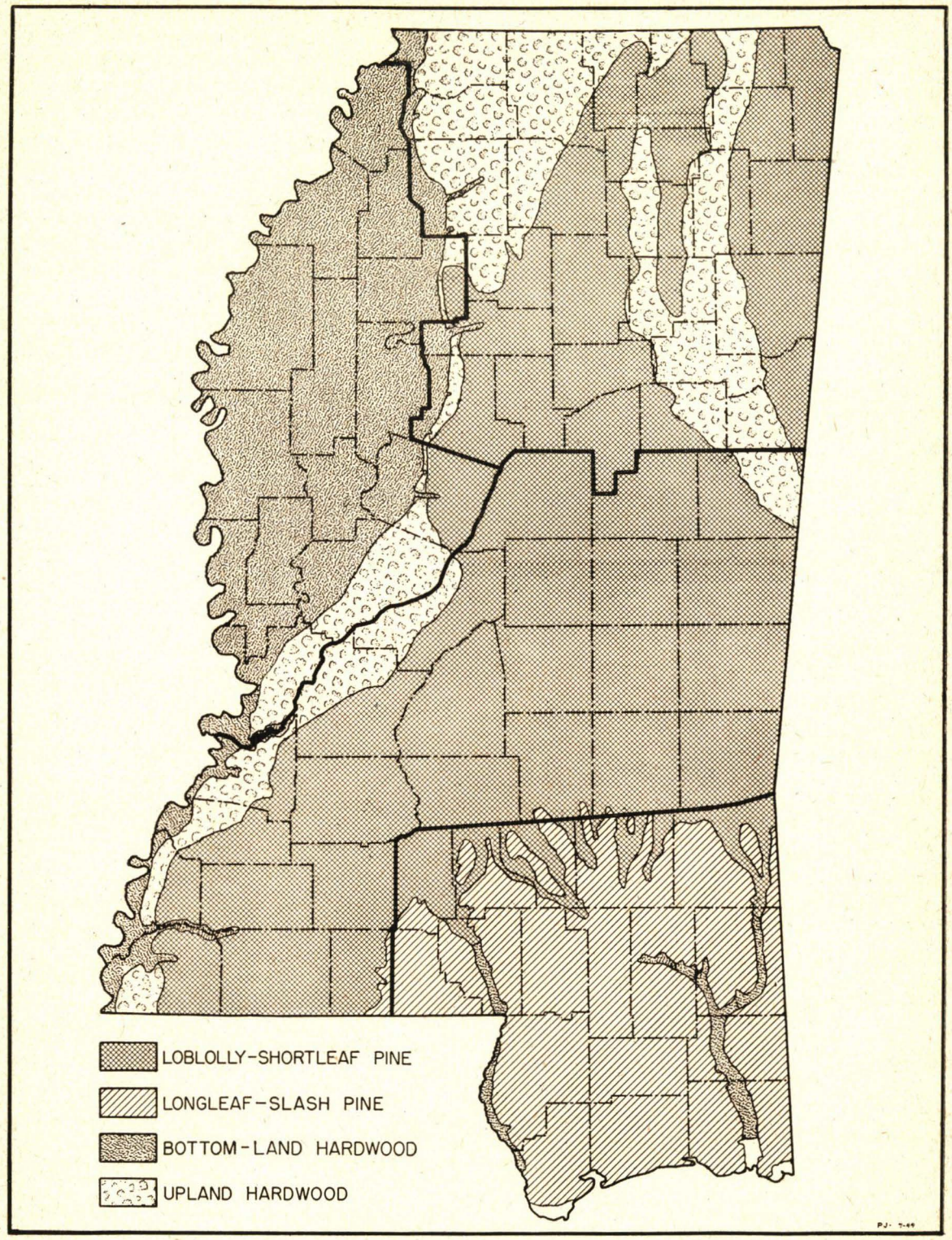

FIGURE 11.—*Generalized forest types in Mississippi. The upland hardwood-pine and cedar types are not concentrated enough to be shown. Many narrow strips of bottom-land hardwood along stream bottoms and small patches of the upland hardwood type are also omitted.*

The Present Forests

Mississippi's forest resource has been strongly altered by the growth and shifting of agriculture for more than a century and by heavy commercial logging for a half century. The forests are still being changed at a rapid rate, a fact which will be discussed in the next section. Here, only the present forests are described.

Forest Land

Some 16.5 million acres out of a total of 30.3 million acres in Mississippi are forest land (virtually all of it classed as commercial).[4] The proportion of land in forest varies considerably among the four Survey regions, as shown by the following tabulation:

	Forest land area, 1946–48	
Survey region:	*Thousand acres*	*Percent of total land area*
North	3,722.9	44
Central	6,020.0	58
South	4,746.4	77
Delta	2,043.2	37
State	16,532.5	54

Nevertheless, with the exception of several highly developed agricultural belts mainly in the Delta and north Mississippi, the forest is fairly well distributed within each region.[5]

Forest Types

More than half the forest is in hardwood types (fig. 11). Bottom-land hardwood makes up about four-fifths of the Delta forest and occurs in the stream bottoms of all regions. Upland hardwood types make up more than half the forest in north Mississppi, but they are also conspicuous in the other regions. The loblolly-shortleaf pine type, found mainly in central Mississippi, includes almost one-third of the total forest acreage in the State. The longleaf-slash pine type, which is the dominant type in south Mississippi, is confined largely to this region.

[4] Definitions of terms will be found on p. 54.

[5] Detailed statistics on 1946–48 acreage—as well as on timber volume, growth, and drain—are in the appendix.

Tree Stocking

Tree stocking throws light on how well the forest is utilizing the growth capacity of the forest soils. A third of the forest land is well stocked; i. e., it has 70 percent or more of the number of growing-stock trees required for full stocking. Four-tenths of the forest land has 40 to 69 percent of the number of trees required for full stocking (medium stocked). The rest of the forest is poorly stocked. Viewed as an industrial plant, a large part of Mississippi's forest land has been shut down or is working on a part-time basis. Its productive equipment needs extensive repairs.

Tree stocking in none of the regions deviates markedly from the State averages, except in south Mississippi, where the longleaf-slash pine type is concentrated (fig. 12). Here, extensive cut-over lands have failed to restock to more than a scattering of trees. Nearly half the forest land in south Mississippi is poorly stocked.

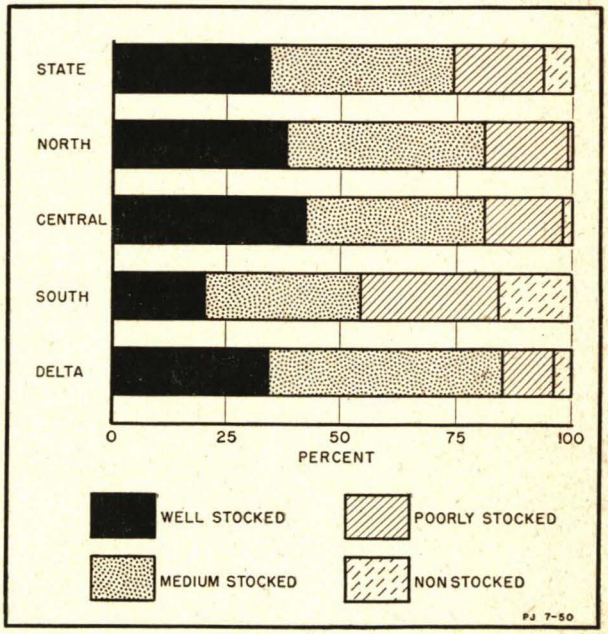

Figure 12.—*Tree stocking in commercial forests by Survey region, 1946–48.*

Low stocking is due partly to lack of trees, especially in stands below saw-timber size. A large portion of it, however, is due to the fact that much of the growing space is occupied by cull trees—unmerchantable species on the dry uplands like blackjack oak, turkey oak, and scrubby post oak, and trees of all species which are eliminated from the growing stock because of defect. One out of every four trees of cordwood or larger size is a cull.

Growing Stock

Sawlog growing stock totals 29.3 billion board feet,[6] an average of 1,776 board feet per acre of forest land. This volume includes all merchantable sawlogs in softwoods 9.0 inches d. b. h. or larger (diameter breast high) and in hardwoods 11.0 inches or larger. The loblolly-shortleaf pine type averages 2,013 board feet per acre; the longleaf-slash pine type, 1,143 board feet; bottom-land hardwood, 2,503 board feet; upland hardwood and upland hardwood-pine types, 1,389 board feet.

Nearly 60 percent of the total sawlog volume is hardwood. In fact, hardwood species predominate in all regions except south Mississippi (fig. 13). Red oaks, sweetgum, and white oaks are the most abundant hardwood species; loblolly pine is, by far, the most common softwood species (fig. 14).

[6] All board-foot volumes quoted in this report are net volume by the International ¼-inch kerf rule. Volume by the Doyle log rule would total about two-thirds as much for the State.

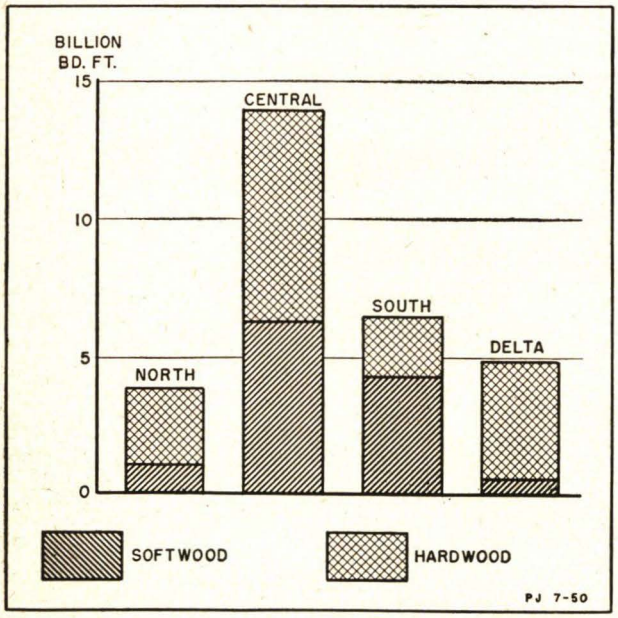

Figure 13.—*Sawlog growing stock by Survey region, 1946–48.*

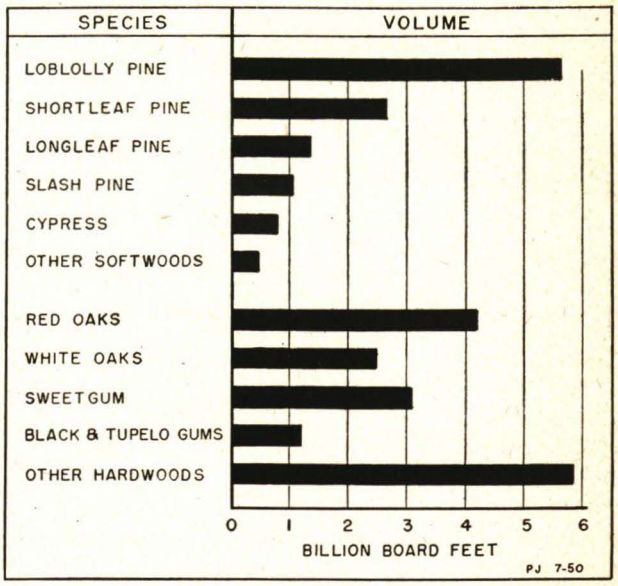

Figure 14.—*Sawlog growing stock by species, 1946–48.*

Total growing stock (which includes sawlog growing stock, tops of softwood sawlog trees, and entire stems of cordwood trees to a minimum top diameter of 4 inches inside bark) amounts to 7.7 billion cubic feet or 466 cubic feet (about 7 cords) per acre of forest land. As with sawlog growing stock, hardwood volume exceeds softwood in all regions except south Mississippi (fig. 15).

Tree and Stand Size

Most of Mississippi's timber is of small size. A third of the total growing stock is in trees of cordwood size (fig. 16), and sawlog volume is concentrated in the smaller sawlog tree sizes (table 2). Softwoods have 43 percent of their sawlog volume in 10- and

Table 2.—*Sawlog volume in Mississippi, by tree diameter, 1946–48*

[In billion board feet—i. e., 000,000,000 omitted]

Diameter class (inches)	All species	Softwood	Hardwood
10–12	8.3	5.3	[1] 3.0
14–18	13.8	5.3	8.5
20–24	5.0	1.3	3.7
26 and up	2.2	.5	1.7
Total	29.3	12.4	16.9

[1] 10-inch hardwoods are not included in sawlog inventory.

12-inch trees and 15 percent in trees above 18 inches. Hardwood sawlog trees are usually larger than softwood; about a third of the hardwood total is in tree sizes above 18 inches.

Sawlog volume is concentrated enough to make saw-timber stands (stands containing at least 1,500 board feet per acre) on 36 percent of the forest land. Cordwood stands comprise 39 percent of the forest; seedling and sapling stands, 14 percent. Restocking or denuded areas make up the remaining 11 percent.

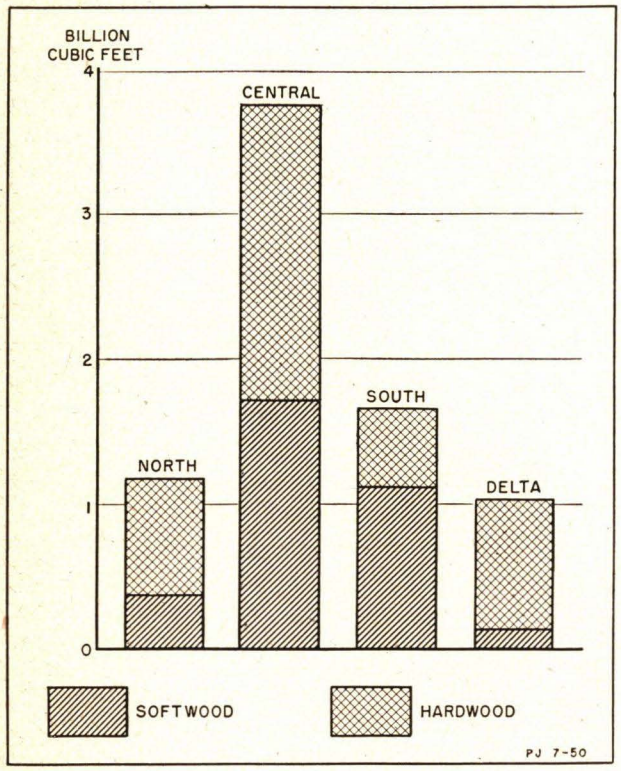

FIGURE 15.—*Total growing stock by Survey region, 1946–48.*

Saw-timber stands are found on nearly half the forest land in the central and Delta regions; cordwood stands predominate in north Mississippi; and the smallest stand sizes show up most commonly in south Mississippi.

Tree and Stand Quality

A third of Mississippi's hardwood sawlog volume is in good quality logs (grades 1 and 2). Nearly half of the volume is in grade 3A logs (fig. 17)—the small logs and knotty large logs whose defects limit their yield of No. 1 common and better grades of lumber to less than 40 percent of their net volume. Most of the grade 3A timber is barely merchantable for saw-

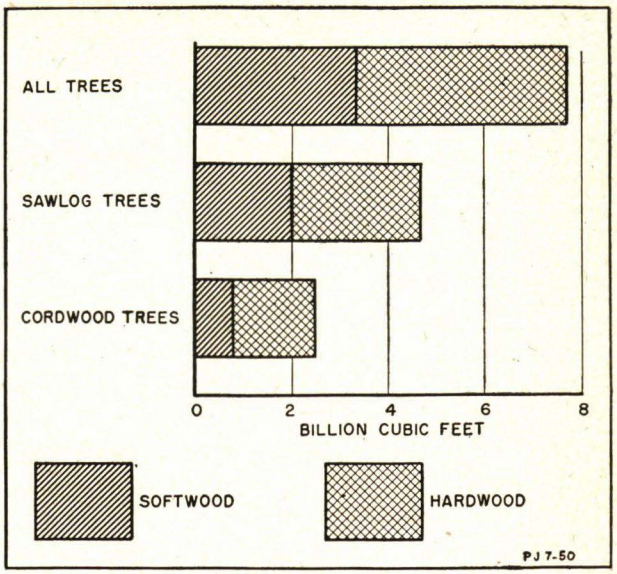

FIGURE 16.—*Total growing stock in cordwood and sawlog trees, 1946–48.*

logs. In fact, the 17 percent of hardwood sawlog volume which is in grade 3A logs occurring in poor stands (stands in which no grade 1 or 2 timber occurs) is frequently considered uneconomic to harvest for standard lumber logs, cooperage bolts, and other hardwood industrial products. As for the considerable volume of grade 3A in small trees, it is true that many trees, if permitted to grow to larger sizes, will develop into higher grade timber; but the general trend is

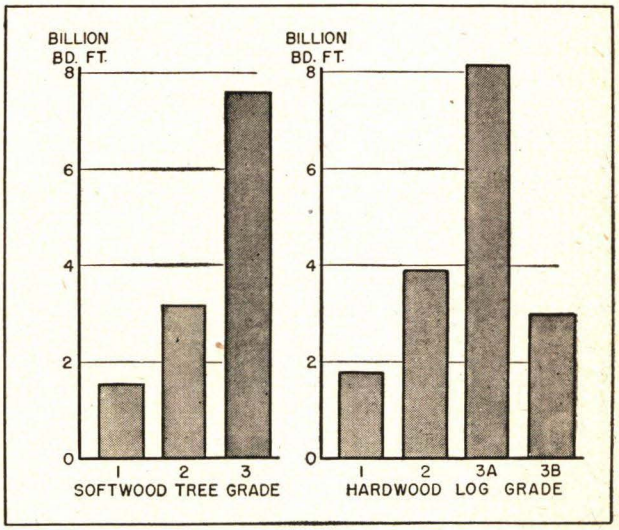

FIGURE 17.—*Sawlog volume by softwood tree grade and hardwood log grade, 1946–48.*

toward smaller average tree size, and this holds a prospect of still lower grades.

Close to a fifth of the hardwood sawlog volume is in grade 3B logs. Logs of this quality are sound and straight enough for ties and timbers, but are not sufficiently clear for lumber logs.

Grade is less important among softwoods in its effect on marketability, but grade does affect softwood timber values considerably. It is significant, therefore, that 62 percent of the softwood sawlog volume is in grade 3 trees (trees having less than 12 feet of clear bole), most of which are in poor quality stands. The proportion of grade 3 volume ranges from 56 percent in the central region to 70 percent in south Mississippi.

Current Growth

Current annual net growth of timber, which includes the ingrowth into growing-stock trees, is 529 million cubic feet on total growing stock (32 cubic feet per acre), 1.8 billion board feet on sawlog growing stock (110 board feet per acre). By contrast, 1946 drain was 554 million cubic feet on total growing stock, 2.5 billion board feet on sawlog growing stock.

Softwood sawlog growth is about the same as hardwood sawlog growth for the State as a whole, despite marked regional differences (fig. 18). In total growing stock, however, hardwood is growing decidedly more volume than softwood. Even in the pine forests, a third of the total net growth is in hardwood species.

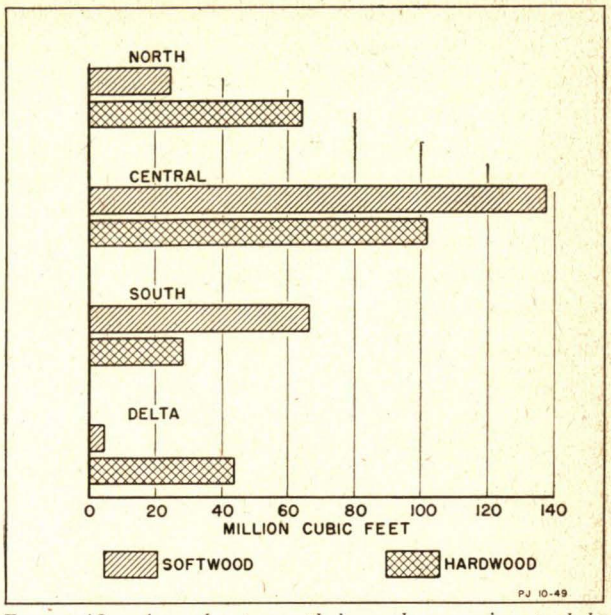

FIGURE 18.—*Annual net growth in sawlog growing stock by region, 1946.*

It is in the smaller tree sizes that hardwood growth is most abundant as compared with pine. In the size range from 5.0 to 8.9 inches d. b. h., hardwood is growing about four times as much volume as softwood. Even in south Mississippi, the growing stock in small hardwood trees provides more growth than its softwood counterpart. A look at the 2- and 4-inch trees reveals where the growth in small hardwoods is coming from. In the pine forests alone, well formed 2- and 4-inch hardwoods outnumber well formed 2- and 4-inch pines by 15 percent.

The Changing Forest Inventory

THE DESCRIPTION of Mississippi's present forests, as revealed by the Forest Survey of 1946–48, needs to be supplemented by an evaluation of the magnitude and rate at which changes in the resource are occurring. For this purpose, we can contrast findings of the recent Survey with the first Forest Survey carried out in 1932–35.

Forest Land

The forest land area of 16.5 million acres is 2 percent more than it was at the time of the first Forest Survey.[7] The biggest change in forest land area took place in north Mississippi. Here abandonment of eroded farm land, and perhaps other factors, resulted in a 16-percent increase in forest area. In the Delta, on the other hand, clearing of land for agriculture was the dominant factor, and forested acreage shrank by 9 percent. In the rest of the State, changes in forest acreage were small.

Forest Types

At the time of the first Forest Survey, 59 percent of the total forest acreage in the State was in stands where pines comprised at least a fourth of the well-formed dominant and codominant trees. Today, the percentage is 45. About 2.2 million acres that were classed as pine forest 14 years ago are now hardwood forest (fig. 19).

The acreage classed as loblolly-shortleaf pine type (including stands of either of these two pines alone) has shrunk by 21 percent in 14 years. This shrinkage occurred in the face of a probably substantial addition to the pine type from the reversion of farm lands to forest. As for the longleaf-slash pine type in south Mississippi, its acreage fell 29 percent.

While the pine forest was receding in the north, central, and south regions, the area classed as upland hardwood forest more than doubled in the 14 years between the two Surveys. Upland hardwood expanded, in part, by occupying newly abandoned lands, especially in the north, but its chief expansion has come from the reduction or elimination of the proportion of pine in pine-hardwood stand mixtures. The combination of forest industry's preference for pine in logging upland sites, and the natural aggressiveness of hardwoods on these sites has been mainly responsible for the considerable spread of hardwood forest at the expense of pine.

Growing Stock

Sawlog growing stock for the whole State is down 24 percent in 14 years—29 percent in softwood species; 20 percent in hardwood (fig. 20). Declines were large in all regions except south Mississippi. North

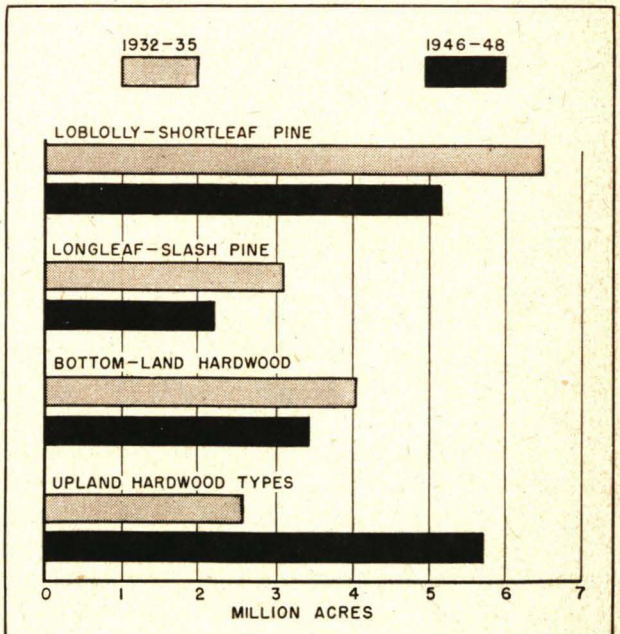

FIGURE 19.—*Change in forest land acreage by forest type between 1932–35 and 1946–48.*

[7] In this and other estimates of change, data from the first Survey have first been adjusted, wherever necessary, to make them comparable with the data from the second Survey.

Mississippi, where the timber was already heavily depleted at the time of the first Survey, lost 40 percent of its sawlog growing stock. Sawlog volume in central Mississippi, roughly half of the State's total, is 25 percent less than in 1932–35. In the Delta, the sawlog resource has declined 29 percent. Only in the south, where half the forest is under at least fair management and where the forest was already heavily cut out in 1932–35, has there been a net increase in sawlog volume: a drop of 5 percent in hardwood was overbalanced by an increase of 8 percent in softwood species.

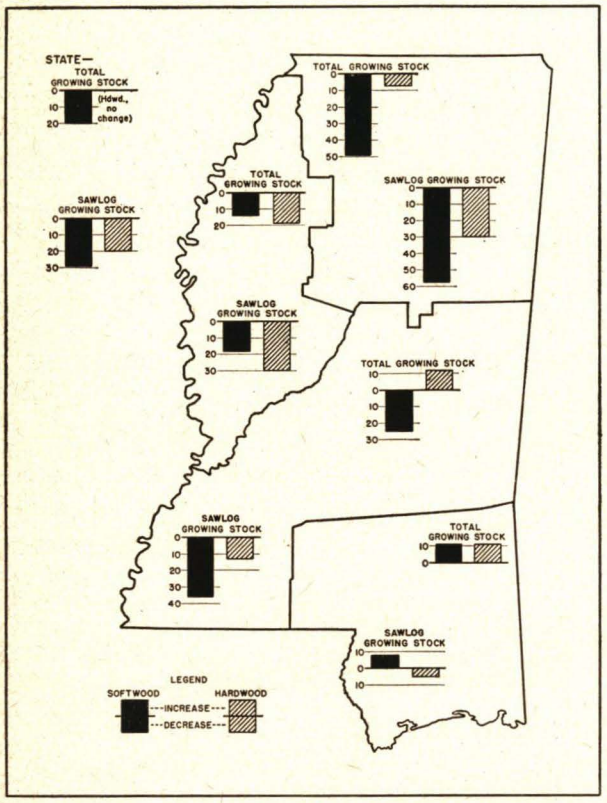

FIGURE 20.—*Percentage change in growing-stock volume between 1932–35 and 1946–48.*

Total growing stock has fared much better than sawlog growing stock. The volume of cordwood trees (trees 5 inches d. b. h. or larger but smaller than sawlog size) has gone up a third, in strong contrast to the downward trend of sawlog volume. Improved fire protection over broad areas and improved cutting practice on some individual properties are a factor in this cordwood increase. It is also true that timber use is concentrated in sawlog-size trees; and the smaller trees, which are frequently unmerchantable, are left standing.

Tree Species

In softwood species, the volume of cordwood trees has increased 8 percent, but sawlog trees have been cut so heavily that the net decline of softwood total growing stock is 20 percent. Softwood total growing stock was reduced by nearly 50 percent in the north region, and 25 percent in the central region. South Mississippi alone, of the regions of the State, has had an increase in total softwood volume: 11 percent.

In hardwood species, a huge increase of more than 50 percent in cordwood trees has balanced a cut-back in sawlog volume of 20 percent. But to interpret these figures correctly, it is necessary to note the sharp changes in tree size and quality which are important elements of deterioration in the hardwood resource. (These items are described in the following sections.) Moreover, one should not overlook significant changes in growing-stock volume by location and several aspects of species changes.

Hardwood sawlog products are taken largely from bottom-land sites throughout the State and from the Bluff hills bordering the Delta. This is partly because a better representation of desired species is obtained from the more favorable hardwood sites; and partly it is a matter of obtaining particular species where they produce higher value timber. Thus, sweetgum, which is a much desired species in bottom land, is frequently inferior over most of the uplands. In fact, over much of the uplands, most sawlog-size hardwoods are ignored by loggers (except for the production of ties and small-dimension stock) or cut only incidentally in pine logging.

It is, therefore, highly significant that hardwood sawlog volume on bottom-land sites—the main producing areas of commercial hardwood—has declined a third or more between the two Forest Surveys. This is a greater decline than for pine in Mississippi.

On upland sites, which produce relatively little commercial hardwood outside of the Bluff hills, hardwood sawlog volume has increased slightly. In comparison with the large decline in pine volume, this denotes a considerable gain of hardwood over pine in upland areas (fig. 21). It bears out the great shift in forest types from pine to hardwood which was described previously. The shift is even more striking when cull trees and other nongrowing-stock trees are included, since these generally undesirable trees are preponderantly hardwood.

The shift from pine to hardwood can be viewed as a problem in all regions, except the Delta. But of simi-

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FIGURE 21.—*The marked preference for pine in upland logging has been a prime cause of the large increase in hardwoods over pine.*

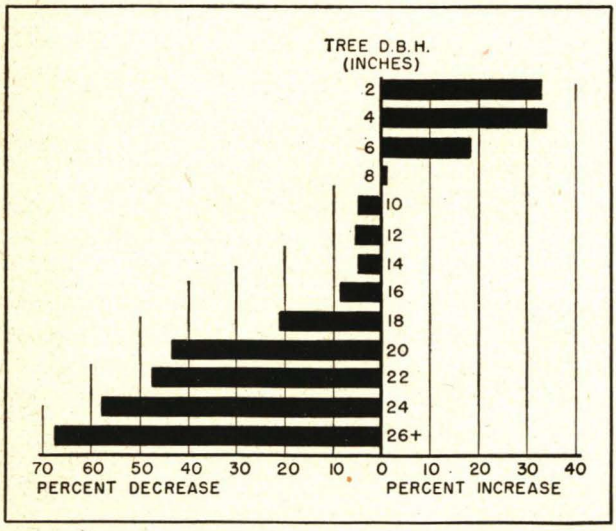

FIGURE 22.—*Percentage change in number of softwood growing-stock trees between 1932–35 and 1946–48.*

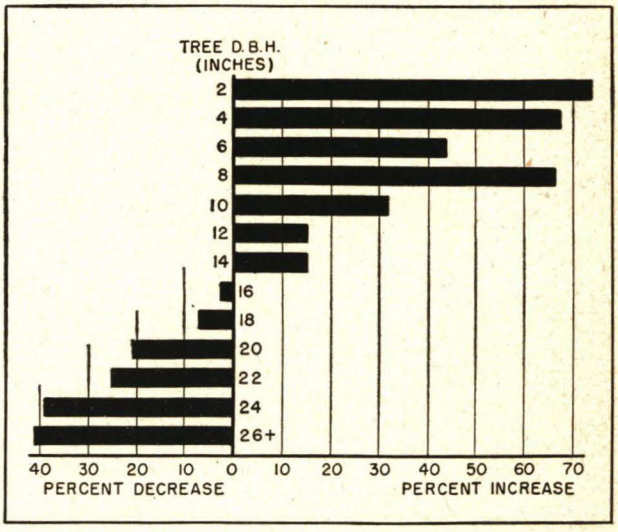

FIGURE 23.—*Percentage change in number of hardwood growing-stock trees between 1932–35 and 1946–48.*

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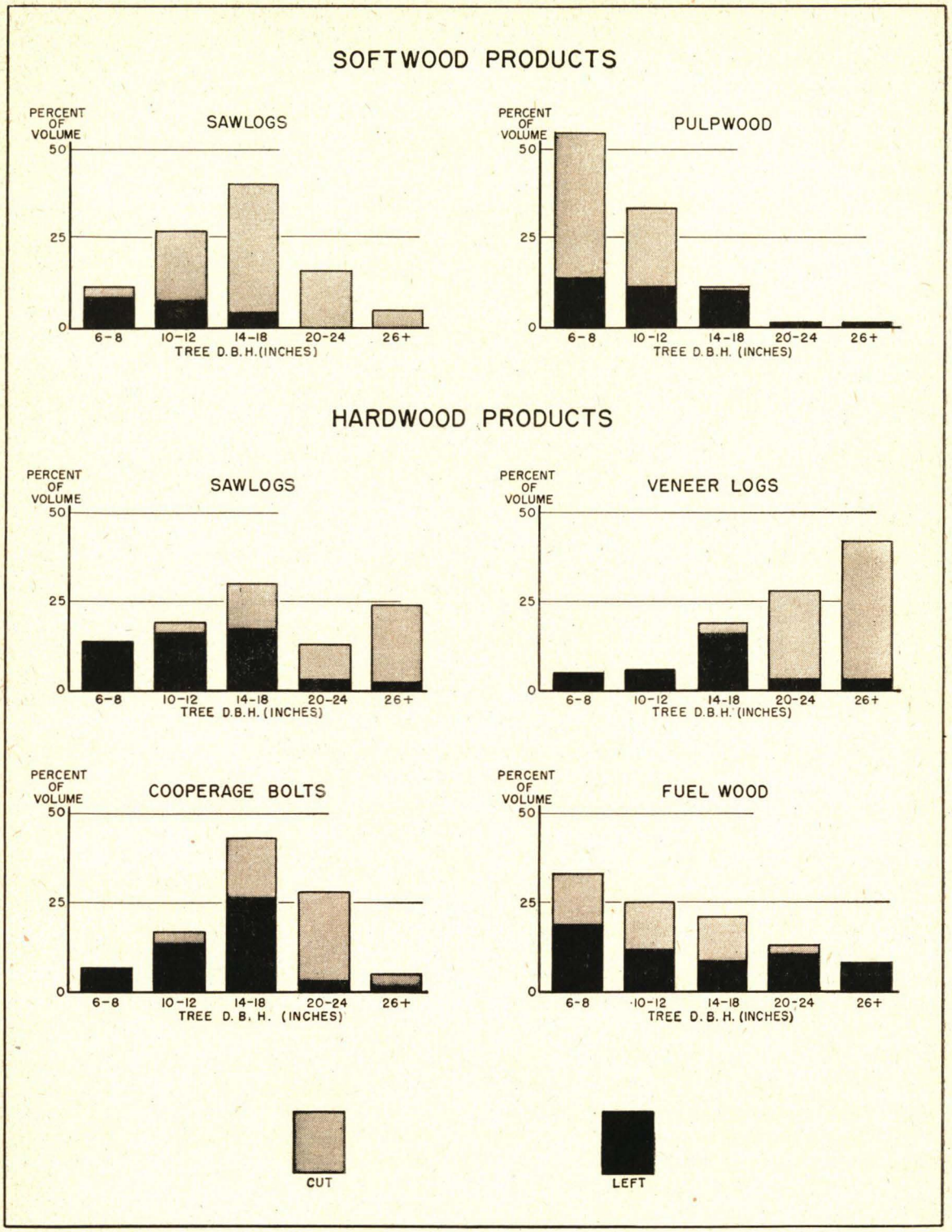

FIGURE 24.—*Total growing stock, by diameter class, before and after logging for major timber products, 1947.*

lar significance is another aspect of the hardwood problem: the replacement of more desired hardwood species with less desired species.

Current sawlog cutting shows a marked preference for the higher-value species. Lower-value species are cut only if they are of good quality, whereas high-value species are cut heavily even in the lower grades. Such differences in logging can only result in the displacement of more desired by less desired species.

Tree Size

One of the most significant aspects of the changes in volume which have occurred since 1932–35 is in tree size. Small trees comprise an ever larger portion of the total timber volume. The average size tree in the growing stock (weighted by volume) is now 13 inches for softwoods, 14 inches for hardwoods.

Changes in tree size are illustrated in figures 22 and 23. In softwood species, 2- and 4-inch trees increased a third; 6-inch trees increased about a fifth; 8-inch trees held their own; and the numbers in all larger classes declined. The rate of decline was sharper with increasing diameter, up to 67 percent for 26-inch and larger trees. In hardwood species the story is similar, except that the small trees showed increases in all sizes up through 14 inches and the decreases in larger sizes were less severe than for softwoods.

Current logging operations in pine stands tend to reduce the stands to smaller tree sizes (fig. 24). Cutting of pine sawlogs, which accounts for 60 percent of the total softwood drain, removes nearly all trees over 12 inches d. b. h., on the average operation, and almost three-fourths of the volume in 10- and 12-inch trees. Pulpwood logging, which accounts for 24 percent of the total softwood drain, works down into smaller tree sizes than sawlogs—the average operation removes three-fourths of the pine volume in 6- and 8-inch trees.

Cutting for pulpwood is apparently lighter in larger tree sizes because most pulpwood chippers are not designed to handle larger timber and because more trees are earmarked for sawlog cutting. Products like hewn ties and fuel wood are not cut so heavily as sawlogs and pulpwood, although they are cut more frequently from particular stands. Not only is the typical pine cutting heavy in regard to volume removed, but the bulk of the volume left standing is in trees under 14 inches in diameter.

Tree size in hardwood stands is being reduced at a slower pace than in pine stands. Hardwood logging, with the exception of fuel wood cutting, is heaviest in the large tree sizes; although, unlike pine logging, considerations of quality and species lead operators to leave many of the larger hardwood trees found in stands. Nor does hardwood logging ordinarily extend into such small diameters as does pine logging. For example, cutting for sawlogs, veneer logs, and cooper-

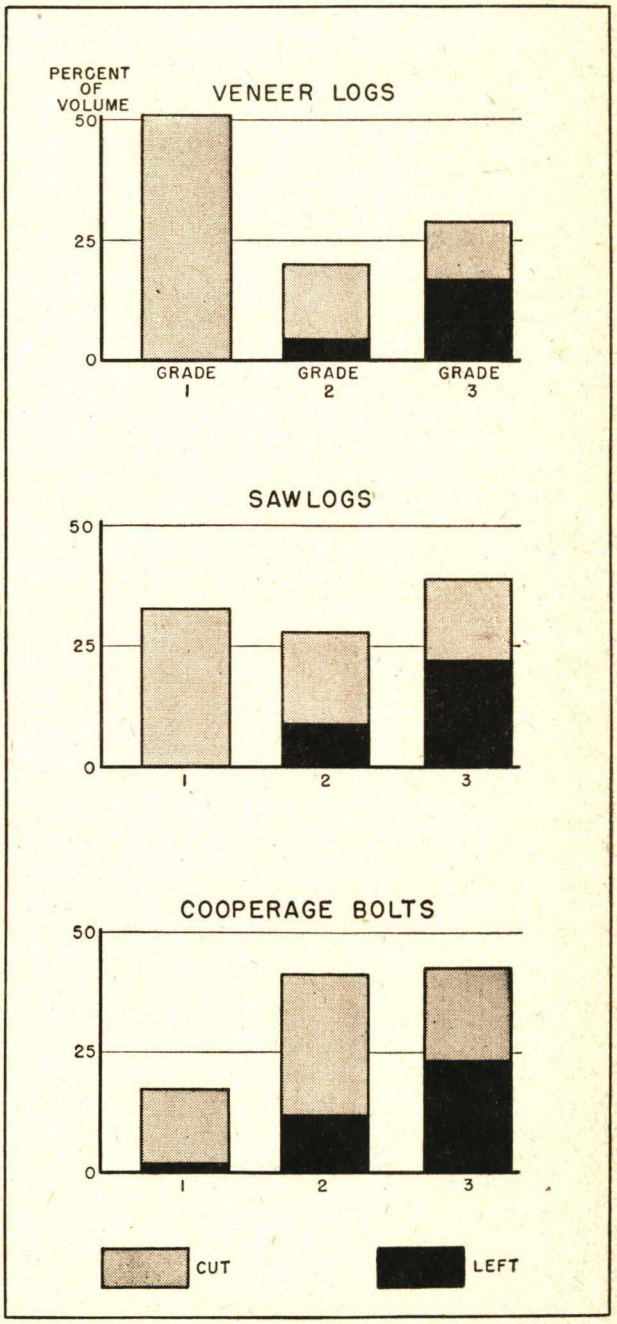

FIGURE 25.—*Quality of timber in hardwood stands before and after cutting for important products, 1947.*

age bolts, which together account for 55 percent of hardwood drain, removes most trees above 18 inches d. b. h., but cutting is much lighter in the smaller tree sizes.

Tree Quality

Aside from changing tree size, there are two clear indications that hardwood quality is on the downgrade. One is the increase in the sound volume of cull timber from 41 percent to 50 percent of the total hardwood growing stock in the 14 years between the two Forest Surveys. This reflects an increase in the number of cull trees.

The other, and more direct indication, is in current hardwood logging operations. Regardless of the product they are interested in, most hardwood operators concentrate their cutting in the better quality trees (fig. 25). On the average, in areas logged over, virtually all trees containing grade 1 logs are harvested; 68 to 77 percent of the volume of trees whose best log is grade 2 is cut; but only 41 to 46 percent of the volume in poorer quality trees is cut. This means that in most logging operations, the sawlog volume left standing is principally in the poorer grades. Such cutting will result in continuous deterioration in the quality of timber stands.

While most pine operators also prefer to cut the better quality trees, their primary interest is in tree size. Pine logging has little influence on the quality of the sawlog volume left standing except as tree grade is affected by tree size.

Forest Land Management

THE CONDITION of Mississippi's forests and the recent changes in inventory indicate an urgent need to improve timber management. This need is centered on private lands. Of the 16.5 million acres of commercial forest land in the State, only 1.7 million acres are held by the public and the bulk of the public lands is well managed. While most of the county-owned forest land (0.4 million acres) is not formally managed, the national forests (1.0 million acres) and most of the other Federal and State lands (0.3 million acres) are rebuilding.

Except for county forest land, which has been held by the counties for many decades, most public land was acquired during the 1930's. It was largely depleted forest, much of it in no better condition than the average of private holdings. Yet now, the public forest has a higher proportion of saw-timber stands than does the privately owned forest, and more sawlog and total volume per acre.

	Ownership	
	Public	*Private*
Saw-timber stands.....percent..	46	35
Volume per acre:		
Total growing stock.....cu. ft...	553	456
Sawlog growing stock.....bd. ft...	2, 391	1, 705

The public forests can be counted on for increasing supplies of timber in the future, but if the forest resource trends in Mississippi are to be reversed and an approach made toward sustaining or expanding forest industry, that effort must be centered on privately owned forest land.

THE LEVEL OF PRIVATE FOREST MANAGEMENT

Timber management on privately owned land was appraised in 1947–48 in a study of Mississippi forest management.[8] This study was not a part of the Forest Survey, but its findings are highly useful in interpreting the Survey results. Management was rated on the basis of cutting practices (including related silvicultural measures) and fire protection. In south Mississippi grazing damage to tree seedlings and saplings was evaluated along with fire damage.

Cutting is an important phase of management because the way in which it is done determines, to a large extent, the subsequent development of the forest: the speed and adequacy of reproduction, the kind of tree reproduction, the species composition and quality of stands, the rapidity of growth in residual trees. The role of fire is less clearly recognized. Prescribed burning can be a useful tool in the longleaf-slash pine type and sometimes in other forest types for obtaining desired tree reproduction, controlling disease, and forestalling the damage that comes from uncontrolled fire. But most fires are very injurious to Mississippi's forest.

Wildfire destroys seedlings and small trees by the millions (fig.26). It kills or wounds larger trees and exposes them to damage from disease and insects. Repeated wildfire, as well as cutting, has been important in eliminating pine from many upland stands

TABLE 3.—*Rating of management, cutting,*[1] *and fire protection* [2] *on privately owned forest land in Mississippi, 1947–48*

Rating	Management	Cutting	Fire protection
	Percent	*Percent*	*Percent*
Excellent	1	2	3
Good	4	10	18
Fair	23	21	35
Poor	41	26	7
Very poor	24	32	17
Destructive	7	9	20
Total	100	100	100

[8] A detailed report on forest landownership and management in central Mississippi, made in cooperation with the Mississippi Agricultural Experiment Station, was published. This study was later supplemented by similar work in the other regions of Mississippi.

[1] Management and cutting apply to 13,423,000 acres. Properties on which no commercial cutting occurred during the past 10 years or during the present owners' tenure were not given a cutting classification.

[2] Fire protection applies to the 14,785,400 acres of commercial forest in private ownership.

and replacing it with hardwoods of lower value (fig. 27): Protection against grazing damage is often a factor to be weighed along with fire protection, especially in south Mississippi, since unrestricted grazing may be as important as fire in limiting the establishment and early growth of stands.

Under the classification system used (the basis for rating management is explained in the appendix, p. 57), little more than a fourth of Mississippi's private forest land management rates fair or better; nearly three-fourths rates poor or worse (table 3). These findings go far to explain the deterioration in the forest resource recorded by the Forest Survey.

South Mississippi, with 44 percent of its private forest management rated fair, good, or excellent, shows up better than the rest of the State (fig. 28). This throws light on the resource trends, the fact that south Mississippi has been making some gains in growing

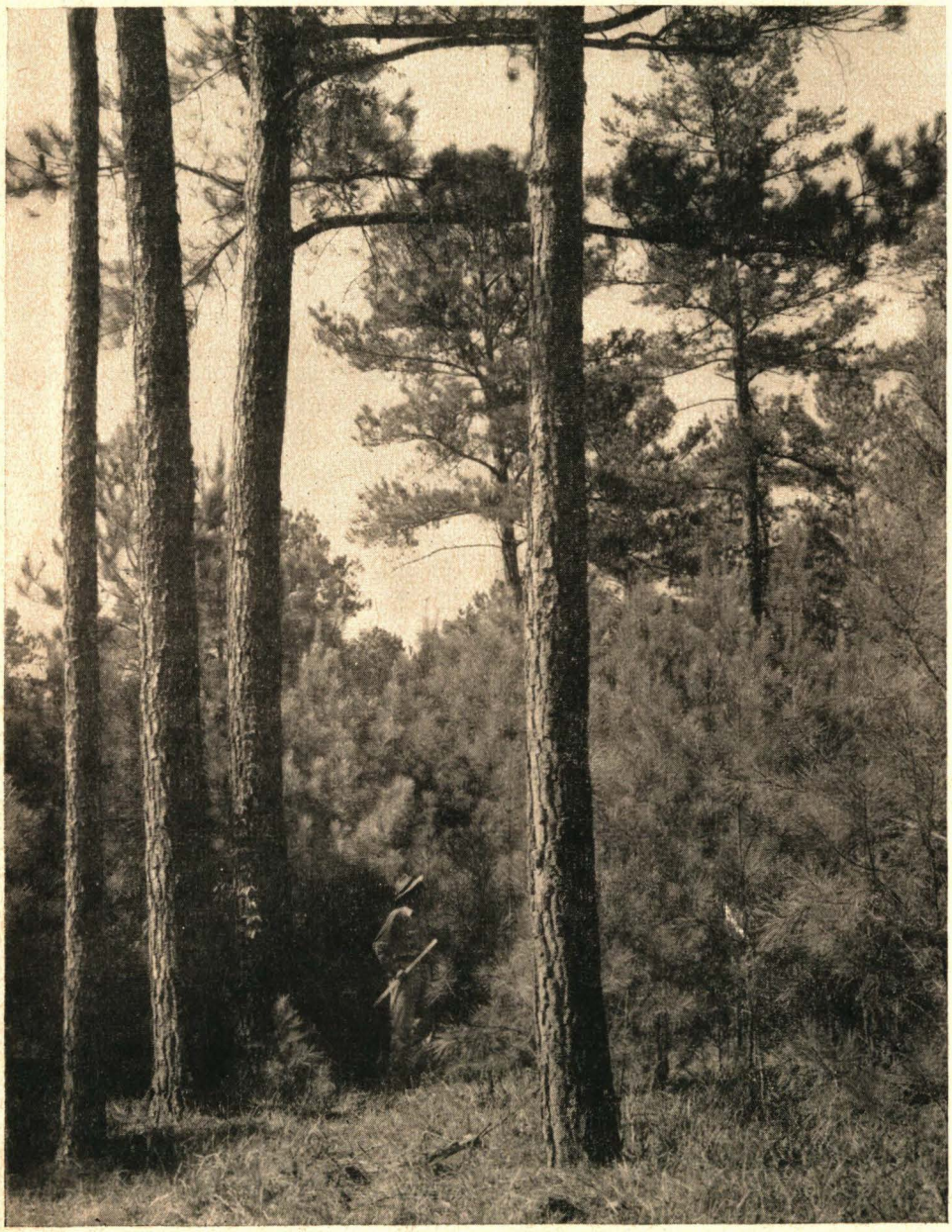

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FIGURE 26.—*With effective fire protection, loblolly pine reproduction is growing up in this stand.*

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FIGURE 27.—*This farm woodland was last cut for sawlogs in 1925. Excellent seed trees were left, but annual burning has destroyed virtually all pine trees in the understory.*

stock while other regions have been losing. The central and north regions are much alike in their management records, except that the central region has 9 percent of the forest under good or excellent management as contrasted with 5 percent in north Mississippi.

The Delta has the most consistently poor cutting practice in the State. Only 10 percent of its privately owned forest is under fair or better management. At least part of the explanation is that the Delta forest is practically all hardwood, and hardwood forest requires more conscious effort and skill in cutting to achieve fair results than does pine.

How Timber Management Differs Among Private Owners

There are about 146,000 private forest landowners in Mississippi. Private forest management is as varied as the owners are, but grouping owners into occupation and size classes helps to simplify the picture.

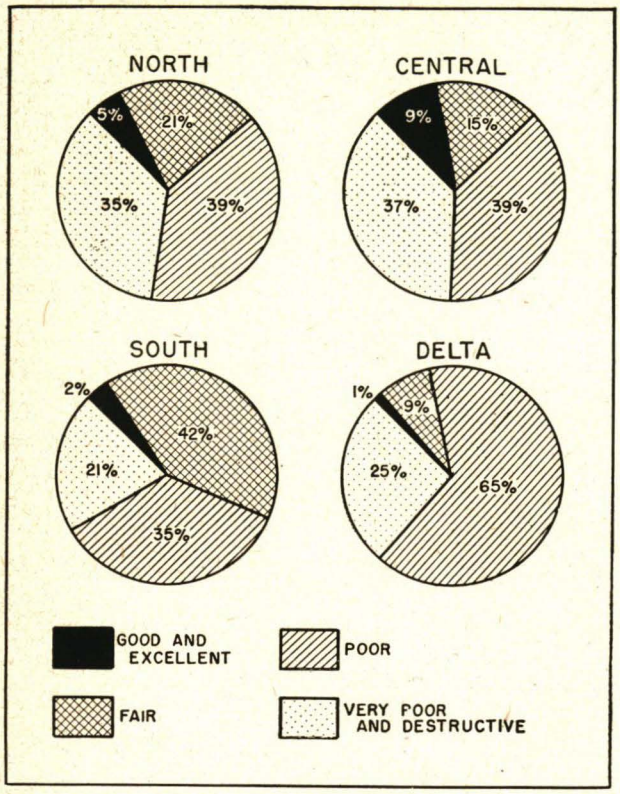

FIGURE. 28.—*Management rating of privately owned forest by region, 1947–48.*

The largest class of private forest landowners—both in numbers and area held—is that of farmers, as shown by the following tabulation:

	Private ownership of commercial forest land	
	Number of owners (thousands)	*Land area (million acres)*
Cotton, general, and cotton-vegetable farmer	77.4	4.4
Other farmer	16.1	2.6
Businessman, housewife, wage earner, and professional worker	48.3	5.1
Lumber company	.1	1.2
Pulp company	(1)	.5
Sawmill owner-farmer	1.7	.3
Concentration-yard owner	(1)	.2
Other forest industry	(1)	.1
Real estate company and land speculator	.4	.1
Miscellaneous	1.8	.3
Total	145.8	14.8

[1] Fewer than 50 owners in the class.

Some 93.5 thousand farmers, most of them cotton and general farmers, own 7.0 million acres of forest. Next in importance are the 48.3 thousand businessmen, housewives, wage earners, and professional workers who own 5.1 million acres of forest land. Most prominent among the other classes of owners are the forest-products concerns, whose combined holdings contain 2.3 million acres of forest.

Significant differences in the degree of timber management practiced by various classes of forest landowners are shown in figure 29. The large mass of owners in the class of businessmen, housewives, wage earners, and professional workers and the "other farmer" class follows management practices quite similar to the average for all owners. The very large group of cotton and general farmers, however, is well below the average: four-tenths of their forest holdings are under very poor or destructive management.

As a group, timber-products concerns have much better than average management, but the group includes classes with some of the worst management as well as classes with some of the best. Pulp companies have distinctly the best management of any class of owners. Virtually all of the pulp company land in Mississippi is under at least fair management, and six-tenths of the acreage rates good or excellent.

Lumber companies, as a class, are in the middle of the forest-industry scale. Even the large lumber companies have only a fourth of their acreage under good or excellent management. As for the small lumber companies, the best that can be said is that their average is near the average for all owners: management on more than eight-tenths of their forest land is rated poor or worse. At the lower end of the forest-industry scale are the concentration-yard owners and those small sawmill owners who are also farmers. These classes are characterized by very poor management.

The remaining classes of owners—real estate companies and land speculators and miscellaneous owners (including, prominently, undivided estates)—generally have very poor management practices.

CONTROLS OVER CUTTING AND FIRE

The kind of private timber management practiced in Mississippi can be traced, to a large extent, to efforts to control cutting and fire made by the forest landowners and the State government.

Supervision of Cutting

Supervision of logging operations to insure that logging follows silvicultural principles or, at least, that

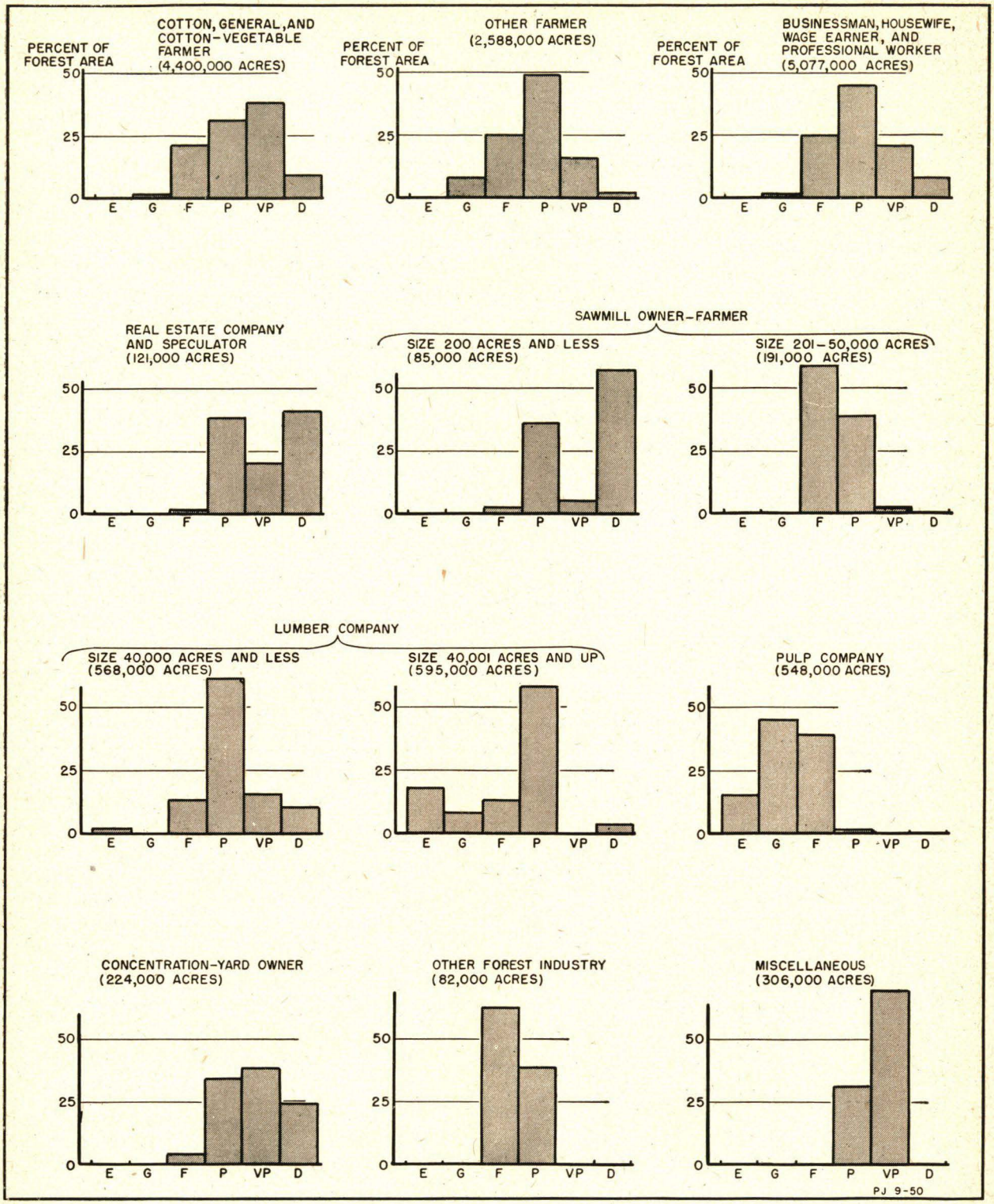
PERCENT OF FOREST AREA
COTTON, GENERAL, AND COTTON-VEGETABLE FARMER (4,400,000 ACRES)
OTHER FARMER (2,588,000 ACRES)
BUSINESSMAN, HOUSEWIFE, WAGE EARNER, AND PROFESSIONAL WORKER (5,077,000 ACRES)
REAL ESTATE COMPANY AND SPECULATOR (121,000 ACRES)
SAWMILL OWNER-FARMER
SIZE 200 ACRES AND LESS (85,000 ACRES)
SIZE 201-50,000 ACRES (191,000 ACRES)
LUMBER COMPANY
SIZE 40,000 ACRES AND LESS (568,000 ACRES)
SIZE 40,001 ACRES AND UP (595,000 ACRES)
PULP COMPANY (548,000 ACRES)
CONCENTRATION-YARD OWNER (224,000 ACRES)
OTHER FOREST INDUSTRY (82,000 ACRES)
MISCELLANEOUS (306,000 ACRES)
50
25
0
E G F P VP D
PJ 9-50

FIGURE 29.—*Management of private forest land by major owner-occupation class and size of holding, 1947–48.* (*E=excellent, G=good, F=fair, P=poor, VP=very poor, D=destructive.*)

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it follows contract limitations of cutting is one of the most obvious means of achieving satisfactory timber management.

Supervision by professional foresters is limited to a tenth of the privately owned forest. Foresters are employed primarily by large forest-products concerns, and it is chiefly the technical management used by foresters which is responsible for the better management characteristic of these firms.

Nontechnical supervision of cutting by the owners themselves is the practice on more than a third of the forest. Although the management ratings associated with such supervision are much poorer than those obtained where a forester supervises, they are superior to the ratings on unsupervised land. Unsupervised cutting, which is associated with the poorest management, is still the rule on more than half the privately owned forest land in Mississippi.

Cutting-diameter Limits

Even where there was no technical supervision of the cutting, it was found that the establishment of cutting-diameter limits sometimes reduced forest deterioration. In Mississippi, cutting diameters are included in at least half the logging contracts, but the limits are frequently no more than an estimate of the limits of merchantability. As such, they are ineffective in avoiding forest deterioration. Large diameter limits, however, provide for more residual trees and a greater likelihood of an improving resource. They help particularly in pine stands, where tree quality is to a considerable degree a function of tree size (fig. 30). Diameter limits are mostly ineffective in hardwood stands because much of the larger timber may be of low quality and tree species may be of overriding significance.

Since small trees are usually preferred for pulpwood, the use of cutting-diameter limits for pulpwood may lead to greater forest deterioration than in logging for larger products (fig. 31, *A*). Pulp companies, some of the other forest-products firms, and a few other landowners use pulpwood cutting as a silvicultural tool on their own lands, and the pulp companies extend timber-marking services to some landowners (fig. 31, *B*). Yet, few forest landowners understand or are in a position to insist that pulpwood cutting be used as a silvicultural tool. In consequence, management usually averages poorer on properties cut for pulpwood than on properties cut for sawlogs and other larger timber products.

Seed Trees

Mississippi's Forest Harvesting Act, which became effective in June 1944, prohibits commercial cutting in pine or pine-hardwood stands unless there is left on each acre a minimum of four 10-inch pine seed trees with well formed crowns, or one hundred 4-inch pine trees. In hardwood stands, analogous restrictions apply except that six seed trees are required. These requirements insure, at best, only fair cutting practices, but if fully observed they would improve timber management considerably more than they have.

In the few years of its operation, the act has undoubtedly improved cutting practice in Mississippi. One estimate is that on forest properties totaling 1.5 million acres, merchantable trees have been left stand-

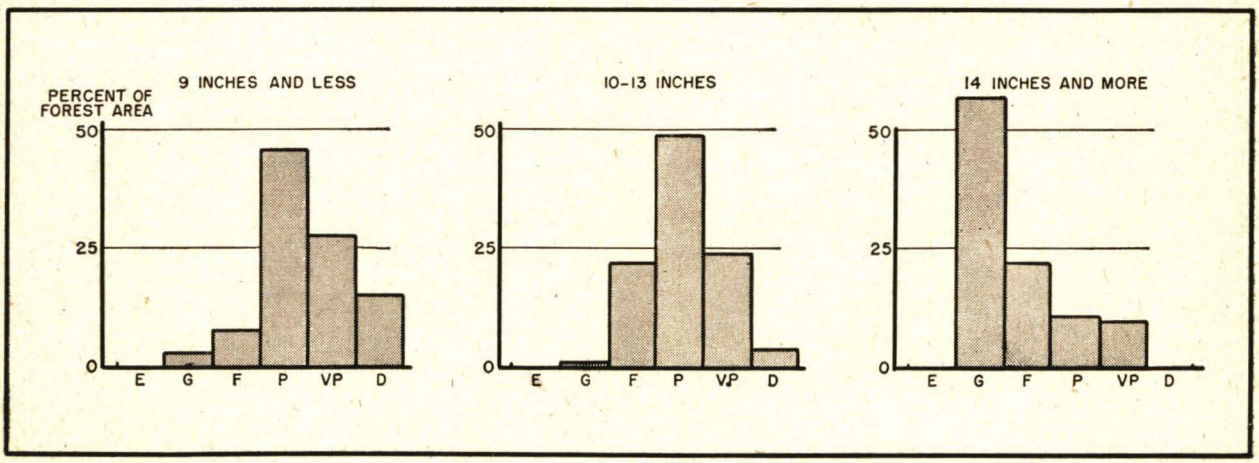

FIGURE 30.—*Management rating of pine forest land as determined by selected minimum cutting diameters, 1947–48. (E=excellent, G=good, F=fair, P=poor, VP=very poor, D=destructive.)*

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FIGURE 31.—*A, Pulpwood cutting is sometimes very damaging to the forest. B, Pulpwood cutting can also be used as a silvicultural tool to improve the forest.*

ing after logging operations only because of the law. This is a considerable achievement, yet an even bigger job remains.

That compliance with the act has not been greater is due to several factors. Apparently, enforcement is hindered by the huge job of checking thousands of cutting operations. This is especially true of the many small contractors who move rapidly from one location to another. The smallness of the penalty—a maximum fine of $50—also encourages many operators to violate the law. That is, they may make a greater immediate income by clear cutting, even when fined, than by obeying the law. Perhaps the chief obstacle to observance of the law is that logging contractors and forest landowners frequently do not realize its value to timber production.

Fire Protection by Forest Landowners

Owners of a large part of the forest try to stop forest wildfires, at least by fighting fires themselves or enlisting the help of land managers, tenants, or neighbors. But owners of only a tenth of the privately held forest install fire lanes, firebreaks, or other structures and equipment. Firebreaks and lanes are used chiefly on small holdings. More elaborate installations and equipment, such as trucks, radios, and airplanes are used mainly on the large industrial holdings.

Management rating is usually better on properties where fire-protection installations and equipment are furnished by the forest owner than on other properties (fig. 32). This relationship exists partly because of the contribution of fire protection to management, and partly because the owners who plan and organize for the suppression of fires also make greater efforts to improve cutting practice.

State Fire Protection

Although private installations and efforts are desirable in protecting forests from fire, it is usually recognized that the main burden for forest-fire protection rests upon the State. In 1947, 26 counties out of the 82 in Mississippi were under the State-administered fire-protection system; in 1949, 38 counties. State fire protection in Mississippi has been making rapid gains in recent years, but it still needs to be extended to many more counties.

Attitudes of Owners Toward Timber Management

Much of the poor timber management in Mississippi is explained by owners' underlying attitudes. Many of these attitudes need to be understood and changed if management is to be improved. In recognition of the importance of the subject, a sample of some 1,000 forest landowners in Mississippi was interviewed in the course of the forest management study.

Burning of Forest Land

Owners of less than 5 percent of the forest land admit burning their own woodlands. This is strong evidence that public and private efforts in the campaign against woods burning have built up considerable popular sentiment against burning. Even when an owner

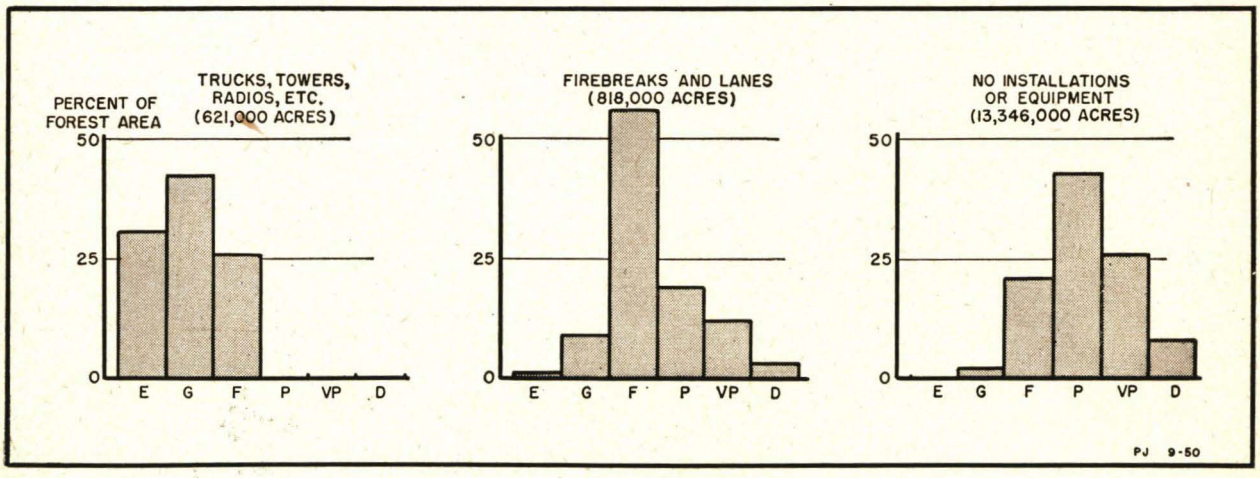

FIGURE 32.—*Management rating of forest land by type of private fire-protection installations and equipment, 1947–48. (E=excellent, G=good, F=fair, P=poor, VP=very poor, D=destructive.)*

privately favors burning or is indifferent to it, he is usually aware of sufficient opposition among his neighbors so that he will not readily admit being a woods burner himself.

More than two-thirds of the owners condemn forest burning vigorously, not only on their own land but on any forest land. Roughly one-fifth of the owners are mildly opposed, and only a small fraction of them appears to be indifferent to fires or actually in favor of them. Average annual burn for owners expressing strong opposition to forest fires is less than the burn for owners who express only mild opposition, and much less than the burn for owners who are indifferent or who actually favor fire.

The stigma attached to woods burning does not apply to the burning of open land. Hence, owners of one-sixth of the forest do not hesitate to say that they burn their fields, chiefly to improve grazing and to clear brush. This is not a measure of the extent of woods burning by landowners, since many owners who burn their fields wish to avoid woods burning. Nevertheless, good intentions, unless joined to action, are not effective in preventing fire from getting away into the woods. Owners who burn their fields have a larger annual forest burn than those who do not burn their fields.

Concepts of Timber Management

Concepts of what timber management means vary greatly, but the forest landowners can be grouped according to their dominant ideas about timber management. Owners of close to half the private forest apparently have no idea at all; or think it is government nonsense; or have some notion limited to fire protection, or at best, to planting. Most of these owners do not recognize that their timber management could be improved. So much forest land under the control of these owners, most of them small owners, points out a vast field for forestry education.

Clearer ideas, which recognize the need to refrain from complete cutting of all merchantable timber, are held by owners of more than half the private forest. The highest concept of management, that of a high, continuing yield of timber products, is limited to owners of one out of every six acres. Forest-products concerns are the chief owners in the latter group, but owners from many occupation groups are also included.

That concepts of timber management have a direct bearing on management practice is borne out by the fact that management rating improves steadily as owners' concepts of timber management become more comprehensive and accurate (fig. 33).

About half of the owners whose management practice rates poor or worse have definite explanations for their poor practices. Most prominent among the explanations are the inability of some owners to supervise forestry operations because of physical limitations or the demands of more remunerative activity; the lack of interest in timber production because other activities are held to be more important; the preference for present high prices over the uncertain prices of the future; and the need to liquidate timber for cash (fig. 34), a motive which may become more compelling in the event of economic depression.

These explanations are frequently a result of misconceptions and inadequate understanding of forestry.

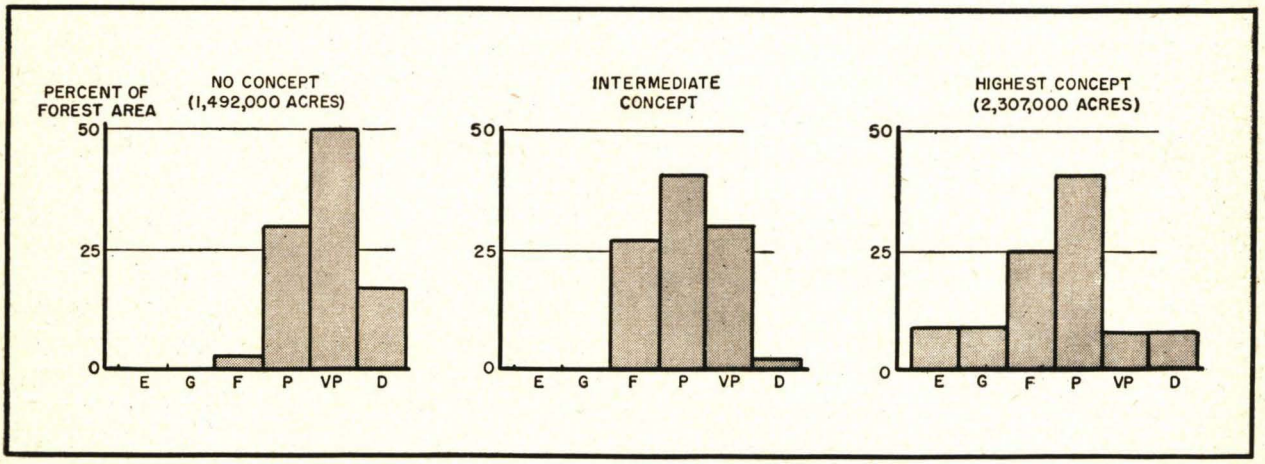

FIGURE 33.—*Management rating of forest land by owners' concepts of timber management, 1947–48.* (*E=excellent, G=good, F=fair, P=poor, VP=very poor, D=destructive.*)

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FIGURE 34.—*On a poor farm, the owner's constant need for cash may be as significant as lack of knowledge in causing the mismanagement of his forest.*

Nevertheless, they are quite real to the owners themselves, and it must be realized that even a full knowledge of timber-producing potentialities will not always erase these obstacles to good timber management.

MISCELLANEOUS INFLUENCES ON TIMBER MANAGEMENT

There are several influences, largely beyond the control of the landowner, which are commonly thought to have a strong bearing on private timber management. These are, mainly, forest land taxes, length of tenure, and distance of owner's residence or place of business from the forest.

The range in forest land taxes is from nothing to 35 cents per acre, and sometimes more (the median is 12 cents). Length of tenure shows a very wide range, with 24 percent of the forest land held by their present owners for more than 25 years (the median is 13 years). More than half the forest land is held by people who live on their properties, but 8 percent is held by people who are more than 25 miles distant. Yet despite the wide ranges in each of these factors, none of them affects management decisions enough to show a definite pattern of relationship with management practices. This lack of relationship does not vary by classes of owners.

Forest Industry

FOREST INDUSTRY has been prominent in Mississippi's economy for more than a half century. As the resource declined, output of some timber products was forced into decline also. Other products expanded, however, and at least over the past three decades, the total output of timber products in Mississippi has changed but little. Forest industry remains as a principal part of the State's economy.

PRODUCTION

The 1946 cubic volume of all timber products in the round or split piece was 473 million cubic feet—239 million in hardwood, 234 million in softwood.

In softwood volume, the spotlight is held primarily by sawlogs and secondarily by pulpwood (table 4). Together these items account for 85 percent of the total. Poles and piling are a poor third. Among hardwood products, fuel wood is just behind sawlogs in volume, though far behind in value. Pulpwood, in third place, has come up rapidly, but still comprises only 8 percent of the hardwood output.

TABLE 4.—*Distribution of softwood and hardwood volume in Mississippi, by round and split timber product, 1946*

Product	Softwood	Hardwood	All species
	Percent	*Percent*	*Percent*
Sawlogs	54	37	46
Fuel wood	5	34	19
Pulpwood	31	8	19
Poles and piling	6	0	3
Cooperage bolts	(1)	6	3
Veneer logs	1	5	3
All other	3	10	7
Total	100	100	100

[1] Negligible.

Softwood lumber was the first timber product to achieve commercial prominence in Mississippi. From 1904 through 1929, softwood lumber manufacture in Mississippi rose at the average rate of nearly 20 million board feet a year. But in 1929 the era of big production came abruptly to its end. Softwood lumber output plunged from 2.2 billion board feet in 1929 to a low of 0.4 billion in 1932 (fig. 35).

Softwood lumber manufacture was sharply curtailed over the whole country by the Great Depression, but after 1932 it climbed back fairly rapidly. During 1939–46, national annual softwood lumber production averaged 90 percent of what it was in the 1920's (for the South as a whole, it averaged about 75 percent). In Mississippi, however, no such recovery took place; annual softwood lumber output averaged less than half that of the 1920's. The depletion of pine had been carried too far to permit more than a partial recovery.

Hardwood lumber manufacture in Mississippi, until recent years, lagged far behind softwood. Its peak of 567 million board feet in 1924 was only one-fourth of softwood manufacture in the same year. Nevertheless, the trend of hardwood lumber production has been up over the years, and wartime output of hardwood lumber was greater than in any previous years (fig. 36).

Since pine was in short supply during the war, hardwood production was stimulated. The stand of hardwood saw timber was one-third greater than softwood and quality was of less concern than at any time before or after; hardwood could, therefore, be drawn on to help meet the intense wartime demand. By 1945, hardwood manufacture was nearly nine-tenths of softwood. Since the war, however, hardwood production has shown signs of a contraction which is likely to prove more than temporary.

Most notable of all timber production trends in Mississippi is the spectacular growth of pulpwood cutting. From less than 300,000 standard cords (128 cubic feet per cord) in 1936, output jumped to 1,434,000 cords in 1948—the average increase was nearly 100,000 cords a year (fig. 37). A remarkable feature of this upward trend has been its steady persistence through major changes in the economy from peace to war to peace again.

Other timber products have followed different patterns of output. Veneer-log production has gone

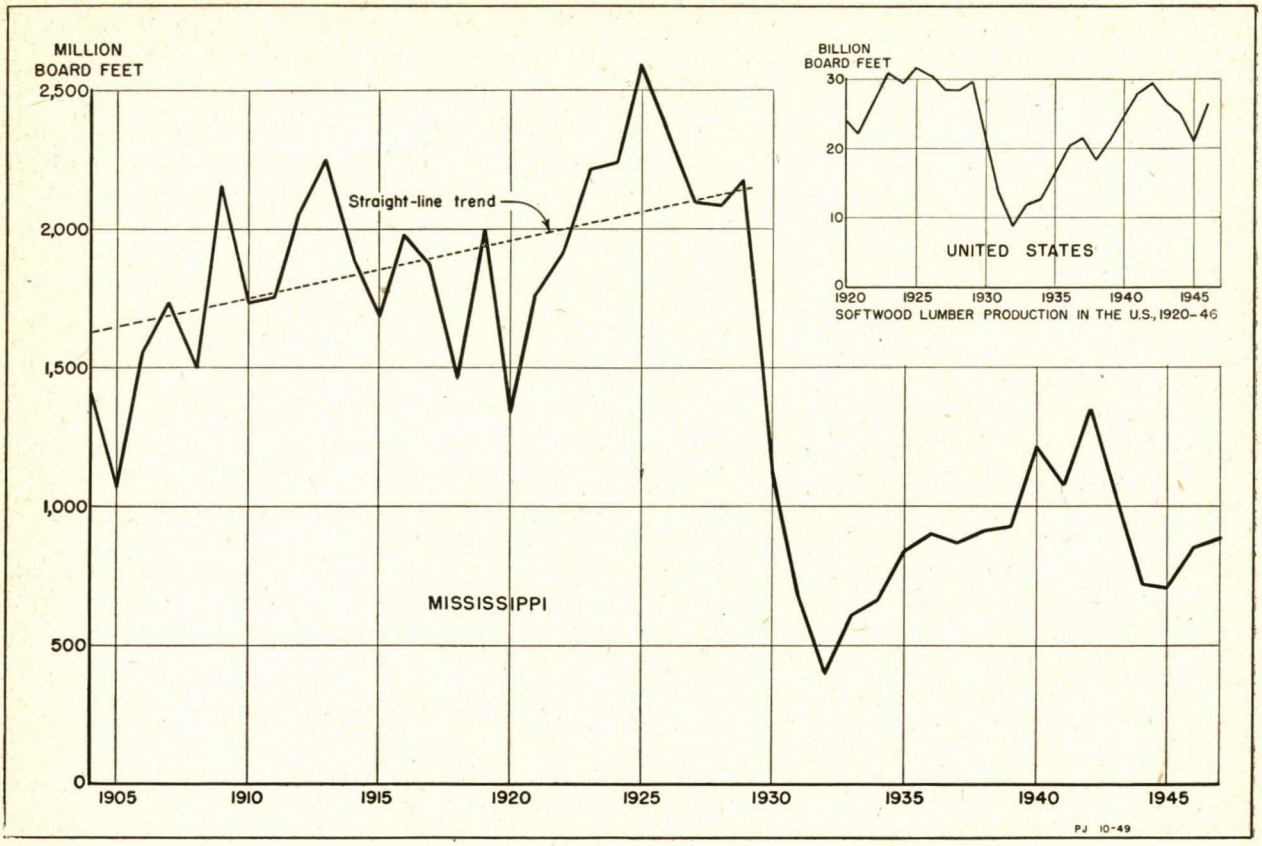

FIGURE 35.—*Softwood lumber production, 1904–47.* (*Source: U. S. Bureau of the Census.*)

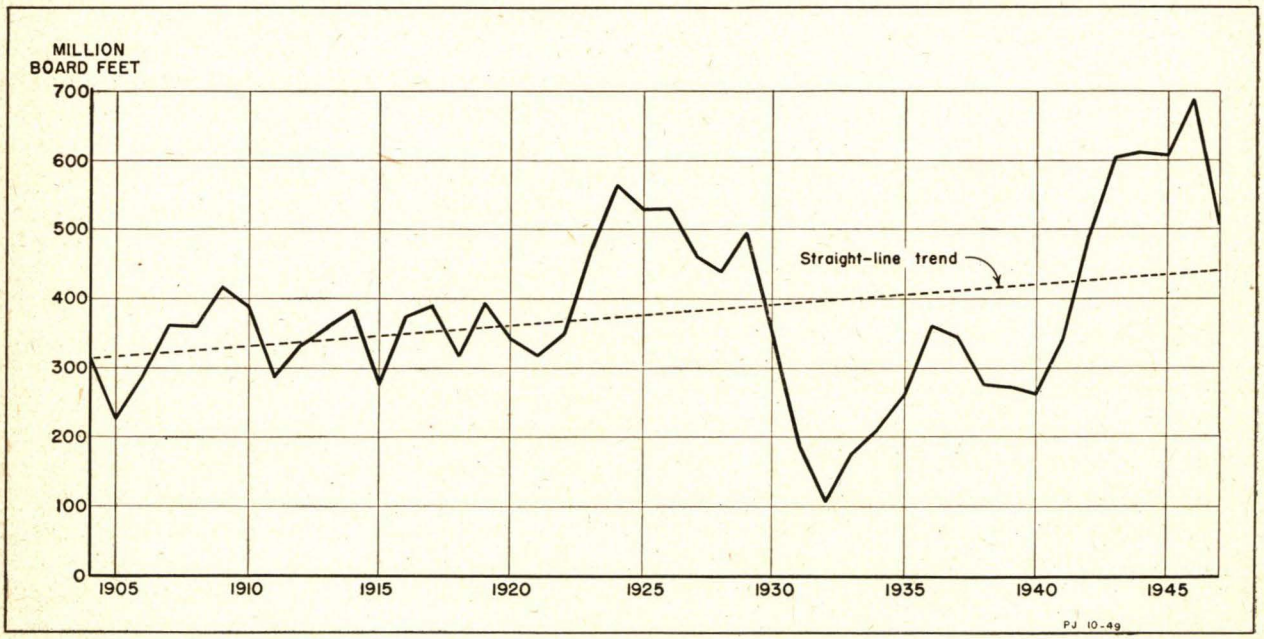

FIGURE 36.—*Hardwood lumber production, 1904–47.* (*Source: U. S. Bureau of the Census.*)

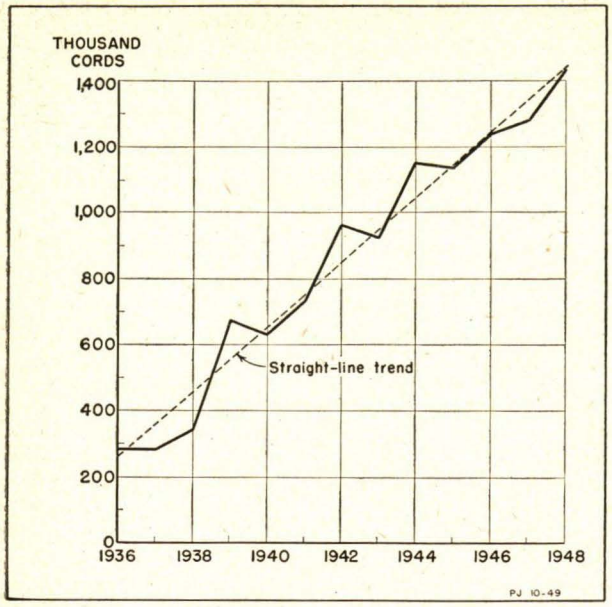

FIGURE 37.—*Pulpwood production, 1936–48.*

through some sharp cyclical changes, but the trend, from the beginning of the published record in 1906, has been upward at the average rate of more than 2 million board feet a year. In 1946, the cut of veneer logs hit an all-time peak of 110 million board feet (International ¼-inch rule). This upward trend reflects an increase in the lower-grade box veneers. Production of quality veneers has barely held even.

The volume of tight cooperage cut rose to about 40 million board feet of logs in 1910, then declined at a fairly rapid rate. Since 1910 production has followed the erratic course of demand, reaching 40 million board feet again in 1946 (International ¼-inch rule), but in general it has remained well below the peak years which preceded World War I. A prominent factor in the decline was the early cutting out of the best white oak.

Slack cooperage output has had a long and steady growth. The peak of 30 million board feet of logs in 1929 was at least doubled in 1946. Little information on fuel wood production is available, but the long-term trend, under the impact of other fuels like coal, oil, and gas, is clearly downward. Little fuel wood is used off the farm, and now nearly one-fourth of Mississippi's farmers use some other fuel either exclusively or predominantly.

The yield of gum naval stores in the State reached its all-time peak of 53,000 barrels (50 gallons per barrel) of turpentine and 185,000 barrels (500 pounds net per barrel) of rosin in 1921. Thereafter, yield fell off rapidly as the virgin pine was depleted. By 1938, gum yield was only 32 percent of the 1921 peak. Subsequently, it dropped year by year to a mere 4 percent in 1946.

In recent years, the stumps of old-growth longleaf and slash pines and the waste liquors produced in pulp manufacture have become the important sources of naval stores. In 1936, some 300,000 tons of stumps were removed from the ground; in 1946, 623,000 tons. State statistics on naval stores turned out as a by-product of pulp manufacture are not available, but this source has been growing in importance.

DRAIN

What does the output of all timber products in the round or split form mean in terms of drain, i. e., the volume of growing stock removed or incidentally destroyed in the harvesting of logs and bolts? [9] For all products combined, total drain on growing stock is 17 percent greater than the total output of timber products in Mississippi.

Sawlogs for lumber alone make up 51 percent of the total drain (554 million cubic feet in 1946.) The next largest items are pulpwood and fuel wood, each accounting for about 15 percent of the total. Of other commodities, only hewn ties amount to as much as 5 percent (fig. 38).

[9] Drain does not include mortality losses. Such losses are accounted for in the calculation of net growth.

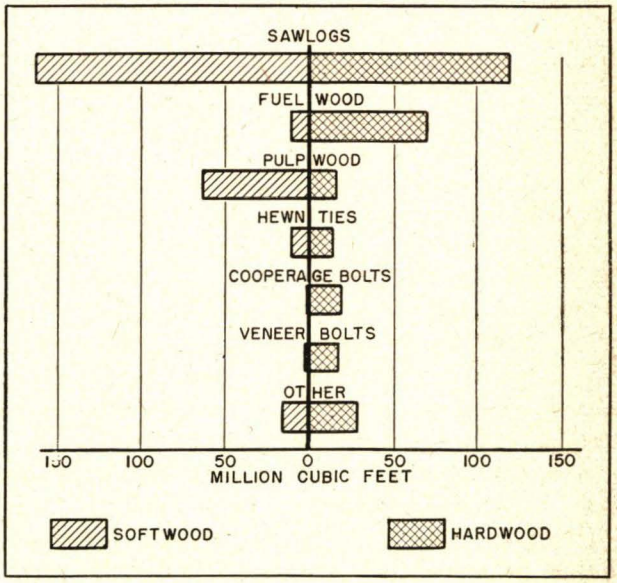

FIGURE 38.—*Drain on total growing stock by commodity, 1946.*

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Plants Processing Raw Products

Sawmills are the most numerous wood-processing plants in Mississippi (fig. 39). Of the approximately 2,000 active mills, all but 102 are small mills sawing less than 3 million board feet apiece annually. Now, more than half of Mississippi's lumber output comes from small mills. Some 150 nonlumber plants also process raw timber products in Mississippi (fig. 40). Although they are only a small fraction of the number of sawmills, their combined output takes two-thirds as much timber volume as does the combined output of the sawmills.

Location of Timber-Cutting Operations

Cutting of timber products by county in 1946 is shown in fig. 41. Softwood sawlogs come mostly from central Mississippi. All other softwood logs and bolts are harvested almost entirely in the central and south regions. The cut of hardwood sawlogs is spread among the counties of the State more evenly than softwood sawlogs, although it is light in much of the Delta and south regions. The cut of other hardwood products is also spread more evenly than other softwood products.

The central region produces about half the timber cut in the State (fig. 42). This region, with 36 percent of the forest land, produces 59 percent of the softwood logs and bolts and 43 percent of the hardwood logs and bolts. The south region turns out 19 percent of the total raw products; the north, 19 percent; the Delta, 11 percent.

Movement of Timber Products to Plants

With the notable exception of pulp mills, most Mississippi plants using logs or bolts do not reach out many miles for timber. The average veneer plant, which has a wider drawing territory than most primary wood-using plants, gets 44 percent of its timber in the same county in which the plant is located. Plants manufacturing miscellaneous wood products get 56 percent of their timber in their home counties and cooperage plants get 61 percent. Sawlog procurement is even more local—sawmills get 74 percent of their timber without crossing a county line.

These averages, of course, obscure large variations among individual plants. The larger the plant and the more specialized its wood requirements in regard to tree size, species, and quality, the larger its drawing territory is likely to be. Among sawmills, particularly, the variation between individual plants is pronounced. Small portable sawmills are highly mobile, taking advantage of the economies of transporting lumber instead of logs. Large mills are stationary, and as adjacent stands of timber are cut out, they must reach in ever-widening circles for new supplies.

Pulp mills usually draw timber from a wide territory. In Mississippi, they obtain 45 percent of their wood from beyond 50 miles.

Radius of pulpwood drawing territory (miles)	*Volume of pulpwood receipts (percent)*
0–50	55
51–100	42
101–150	3
151–200	(1)
	100

[1] Negligible.

For hewn ties and poles and piling, specific data on length of haul are lacking, but the great number of concentration yards insures that the bulk of the volume moves only a few miles to the yards. Subsequent movement, from concentration yard to treating plant, is usually confined to the State, although it may be for a disance of hundreds of miles. Fuel wood, fence posts, and miscellaneous domestic products are mostly used on the same properties where they are cut.

Except for pulpwood, most raw timber products are processed within the State. In 1946, 702,700 cords of pulpwood were exported from the State, but imports amounted to only 42,100 cords. The net export of 660,600 cords was substantially more wood than was used by all the pulp mills located in the State. It amounted to 10 percent of Mississippi's total output of all wood products.

How Has Timber Production Been Sustained?

In view of large declines in Mississippi's forest resource, how has it been possible to sustain the total output of timber products at a fairly high level? The answer, ignoring for the present changes in forest land management, lies mainly in four factors. Most important is the overcutting of the forest resource, the inroads of the wood-using industries on the forest itself. A second factor is in industrial adjustments leading to the use of smaller and poorer quality timber and less desired species for individual products. A third factor is the increased output of less exacting products. A fourth factor, closely related to the third, is the more

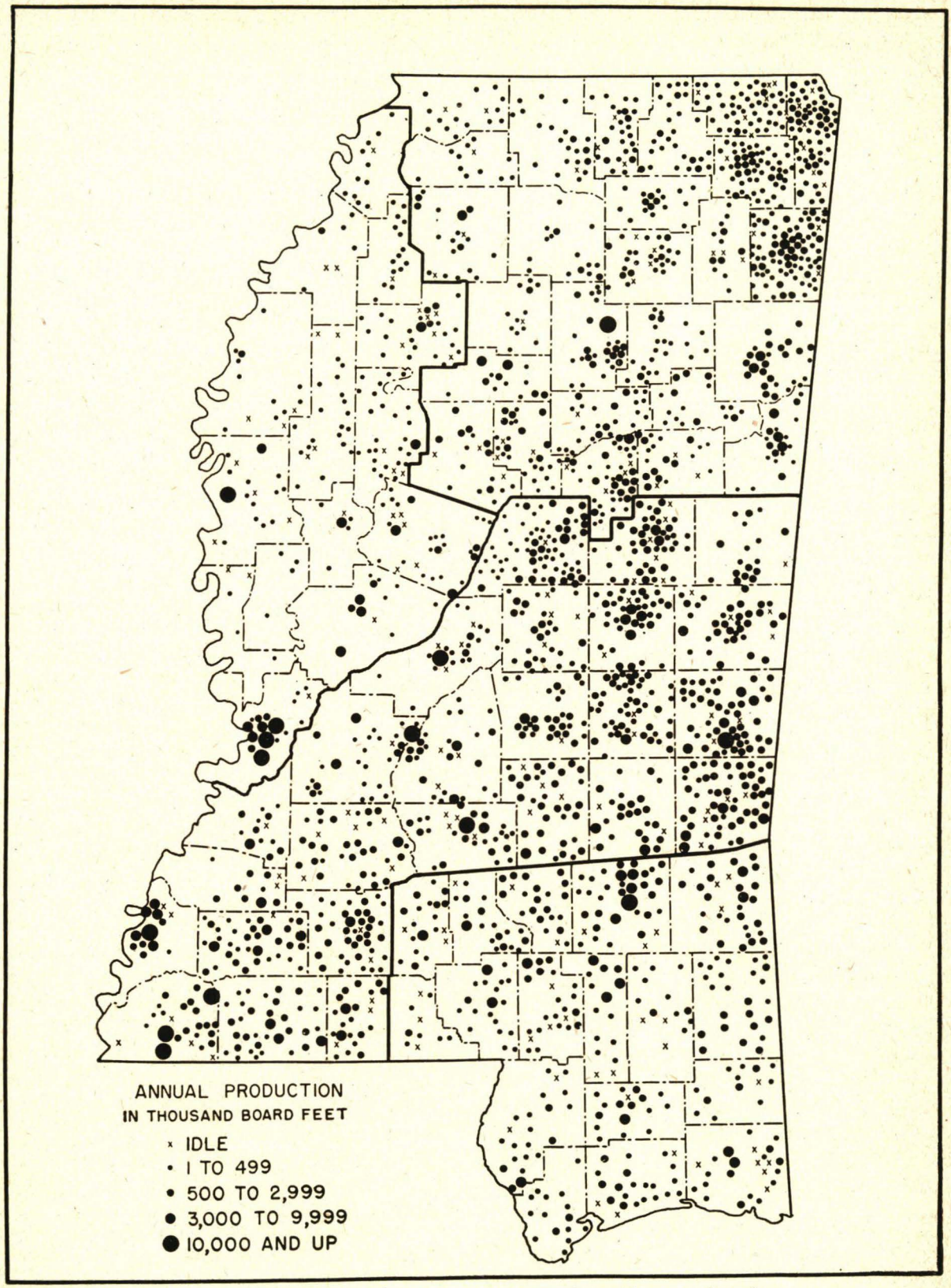

FIGURE 39.—*Location of sawmills, and output, 1946.* *See p. 4 for names of counties.*

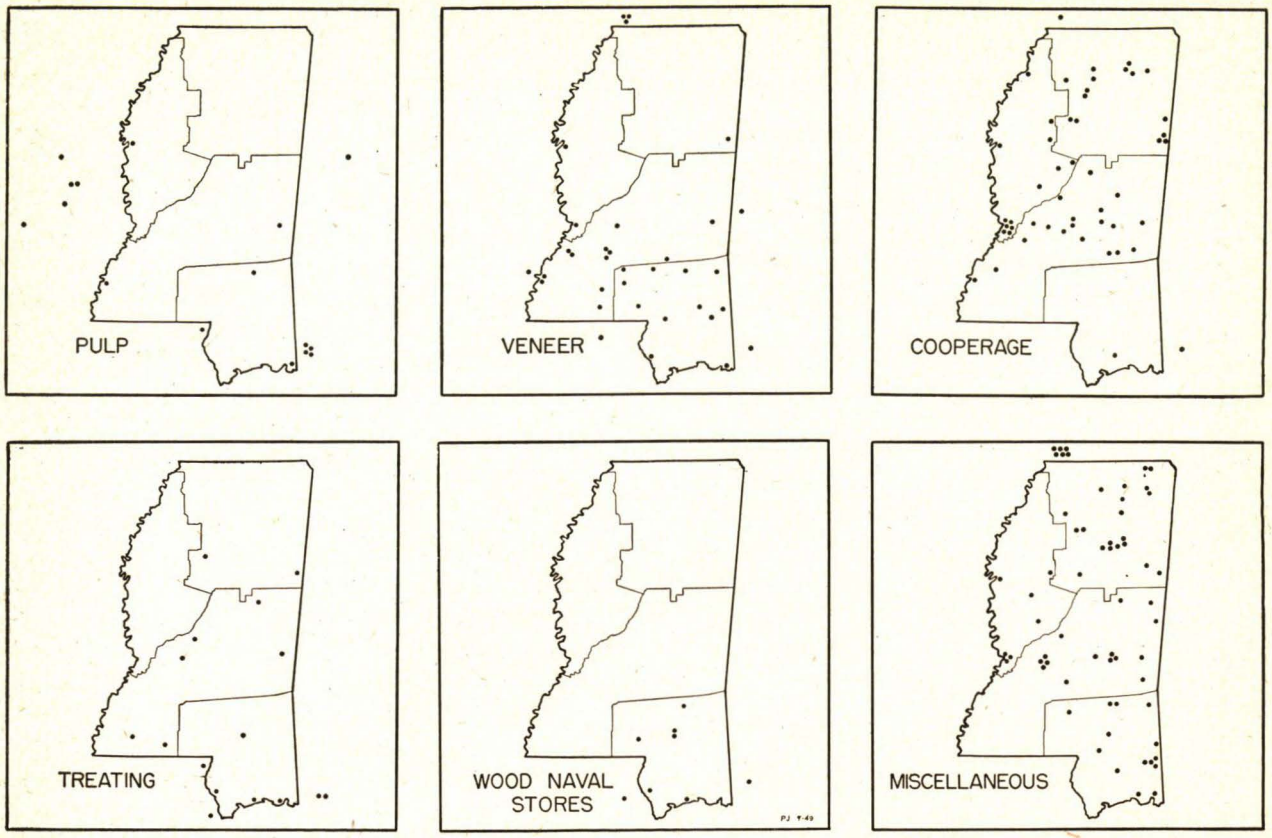

FIGURE 40.—*Location of plants (other than sawmills) that process raw forest products, 1946.*

complete utilization of softwood timber in logging for pulpwood than in logging for sawlogs.

Inroads on the Forest Resource

The magnitude of the changes in the forest inventory is in itself a measure of how the forest has been and is being reduced to sustain Mississippi's output of timber products. Inventory changes in the 14 years between the two Forest Surveys were detailed on pages 19 to 24. They include: the decline in total growing stock by one-tenth; the decline in sawlog volume by one-fourth; the transformation of 2.2 million acres of pine forest types to upland hardwood types; the high-grading of stands in logging which has reduced quality to the point where about six-tenths of the sawlog inventory is low grade and a fourth of the entire growing space is taken up with cull trees; and the steady attrition against larger trees which has reduced the numbers of all softwood trees in sizes above 8 inches d. b. h. and hardwood trees above 14 inches d. b. h.

The reduction in total growing stock alone between the two Surveys was enough to provide a tenth of the total output of timber products over the same period. In terms of sawlog growing stock, the decline in inventory was equal to a fourth of the softwood sawlog production and three-tenths of the hardwood sawlog production during these 14 years.

Use of Less Desirable Trees

The changing forest resource has dictated industry adjustments leading to the use of trees that are below desired sizes and quality and of species formerly rejected. The adjustments have raised the costs of manufacture and lowered the quality of the product, but they have had the virtue of expanding the usable resource.

One of the most significant adjustments has come through the replacement of large sawmills with small mills manufacturing less than 3 million board feet of lumber annually (fig. 43). These small mills have aided greatly in maintaining lumber output in recent decades during which the size of the average tree has diminished and saw-timber stands have become smaller and more scattered. Their mobility, low costs of

operation, and ability to handle small timber economically permit frequent changes of location for a small volume of sawlogs at each setting.

The small sawmill operators have had a stronger influence on the mismanagement of Missisippi's second-growth forests than other lumbermen, since they can cut more deeply into these stands of timber (fig. 44). However, because of the ability of the small mills to utilize scattered stands and small and low-grade timber, lumber manufacture has been sustained far beyond what otherwise would have been possible. Large sawmills get some four-tenths of their pine cut from trees above 18 inches d. b. h., and almost four-tenths from grade 1 trees. But small sawmills get less than two-tenths of their pine cut from trees above 18 inches and one-tenth from grade 1 trees.

In hardwood stands, the differences between small mill and large mill logging are even more pronounced. Actually, the large and small sawmills using hardwood represent essentially different industries in that the small mills use timber of size and quality that the large mills do not or cannot accept. Large mills get 64 percent of their hardwood volume in trees 26 inches d. b. h. and up; small mills get only 12 percent in these

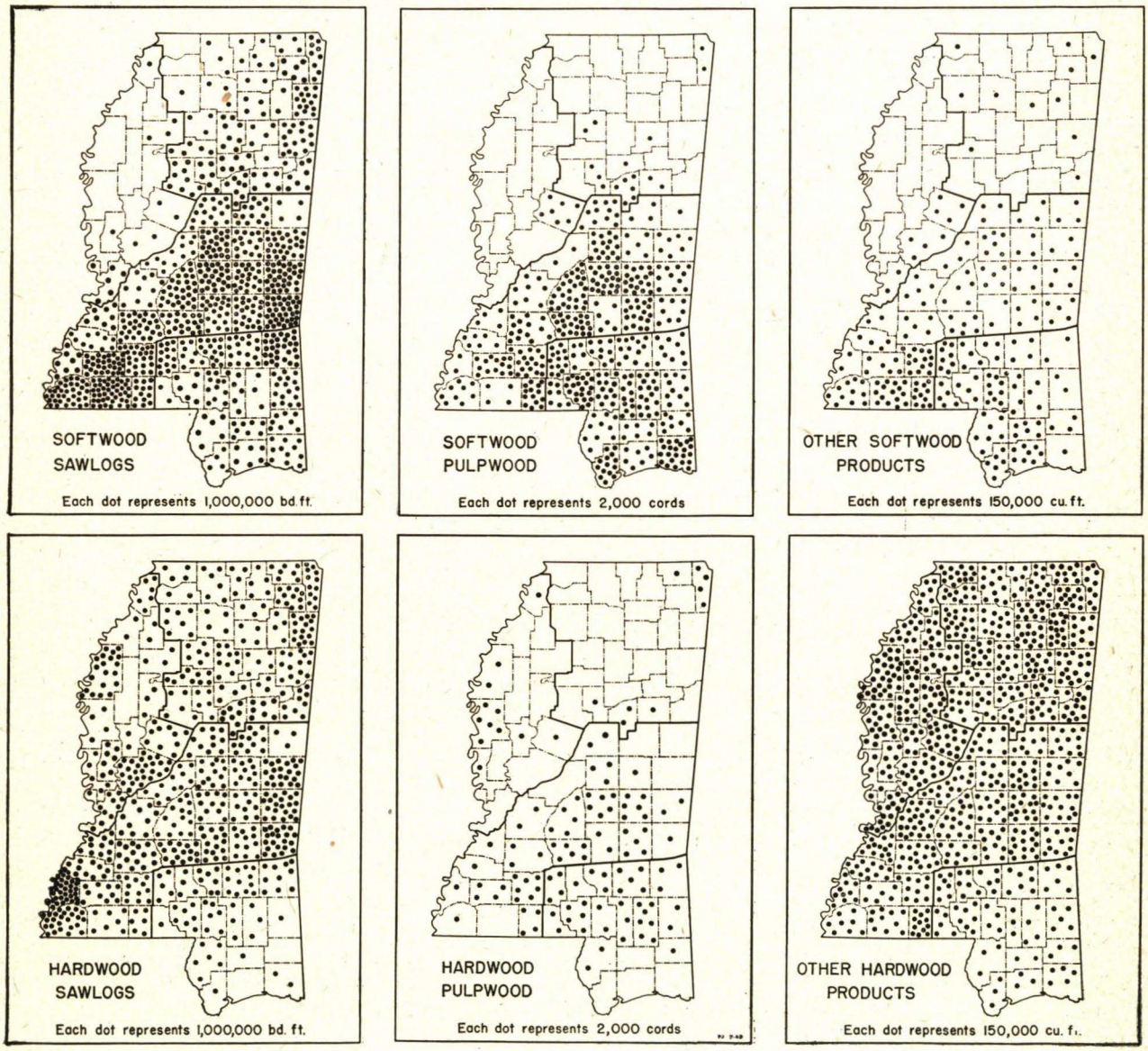

FIGURE 41.—*Cutting of logs and bolts by county, 1946. (A dot represents about the same amount of wood in all six maps.)*

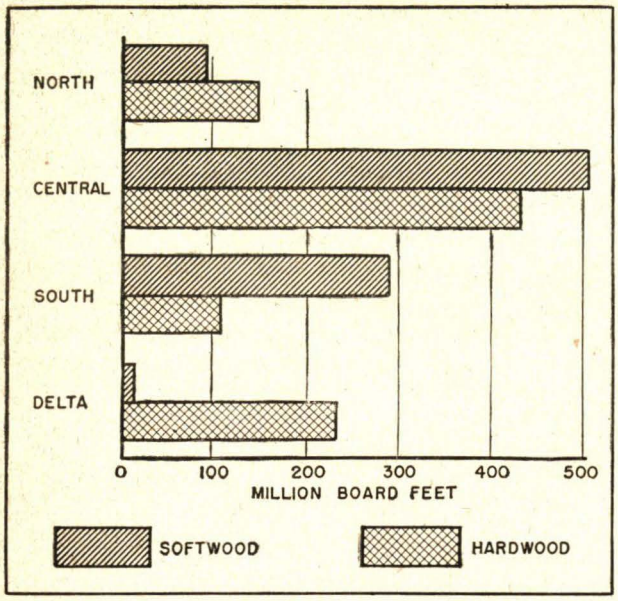

FIGURE 42.—*Total output of all round or split timber products by species group and Survey region, 1946.*

sizes. Large mills get nearly two-thirds of their hardwood volume from trees containing grade 1 logs; small mills get one-tenth of their hardwood from these high-quality trees.

There are strong indications of a general shifting of production to less desired trees. One sign is the increase of hardwood lumber from one-fifth of the total lumber manufactured in 1924 to nearly half in 1944. Although 1944 marked the peak of Mississippi's wartime expansion in hardwood lumber use, much of the increase was the result of the depletion of pine growing stock.

Again, one can point to the considerable expansion in the use of hardwood for pulpwood; by 1946, hardwood pulpwood production in Mississippi reached 254,000 cords, 21 percent of total pulpwood output. Much of this expansion represents hardwood use for specialized pulp products, but some is shifting species utilization stimulated by the abundance of small hardwoods and declines in the generally preferred pine resource.

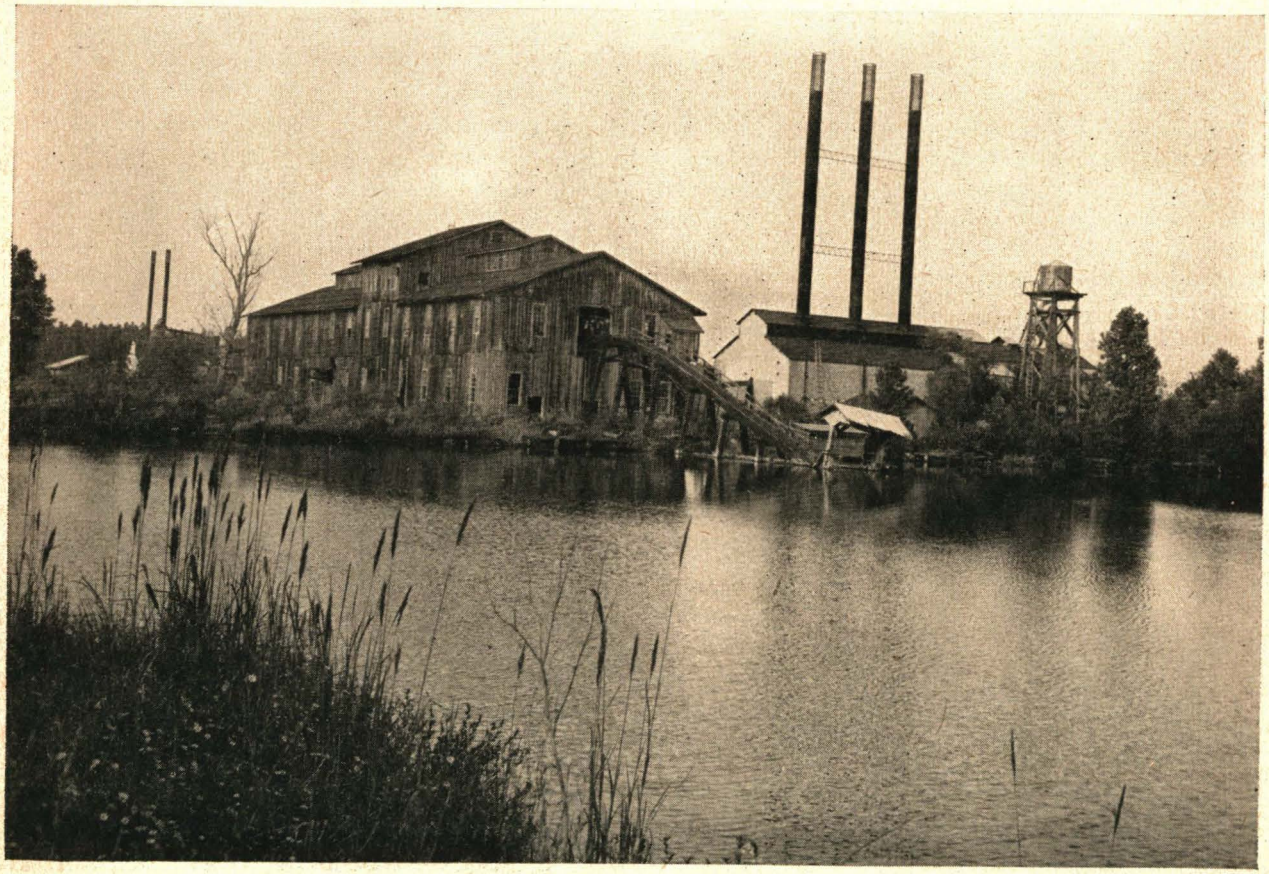

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FIGURE 43.—*Liquidation of the larger timber in its locality led to the abandonment of this large sawmill.*

The Increase in Output of Less Exacting Products

By far the most prominent product change is the replacement of softwood sawlog production with softwood pulpwood production (fig. 45). The volume of pulpwood cut has increased nearly 100,000 cords a year since 1936, enough to compensate, in terms of solid volume, for the large decline in softwood lumber manufacture from the average of the 1920's.

Many factors are involved in these production figures, but one of the big factors is undoubtedly the volume of timber of suitable size available. Sawlog cutting requires larger trees. Necessity has forced softwood sawlog loggers to cut ever smaller timber, yet nearly three-fourths of the cut is still in trees at least 14 inches d. b. h. (fig. 46). In contrast, the pulpwood industry is geared to the use of small trees. Virtually all the pulpwood cut comes from trees 6 to 12 inches d. b. h., a size range in which softwood timber has been sufficiently abundant to support a rapid rise in pulpwood production.

Similarly, cooperage output has changed from tight cooperage, which depended chiefly on good quality white oak, to slack cooperage, which takes a wider variety of species, sizes, and grades. One product is not a substitute in use for the other, but in regard to volume, the substitution was more than enough to sustain output. The point is that tight cooperage was forced into decline in Mississippi as a result of the early cutting out of the best white oak, but the cutting of slack cooperage could expand because of less exacting timber requirements.

Fuller Utilization of Trees Cut

Logging for sawlogs, veneer logs, cooperage bolts, hewn ties, and miscellaneous log products leaves much

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FIGURE 44.—*The increase in portable sawmills, which are adapted to the use of small timber, has helped to sustain Mississippi's timber output as well as to encourage forest liquidation.*

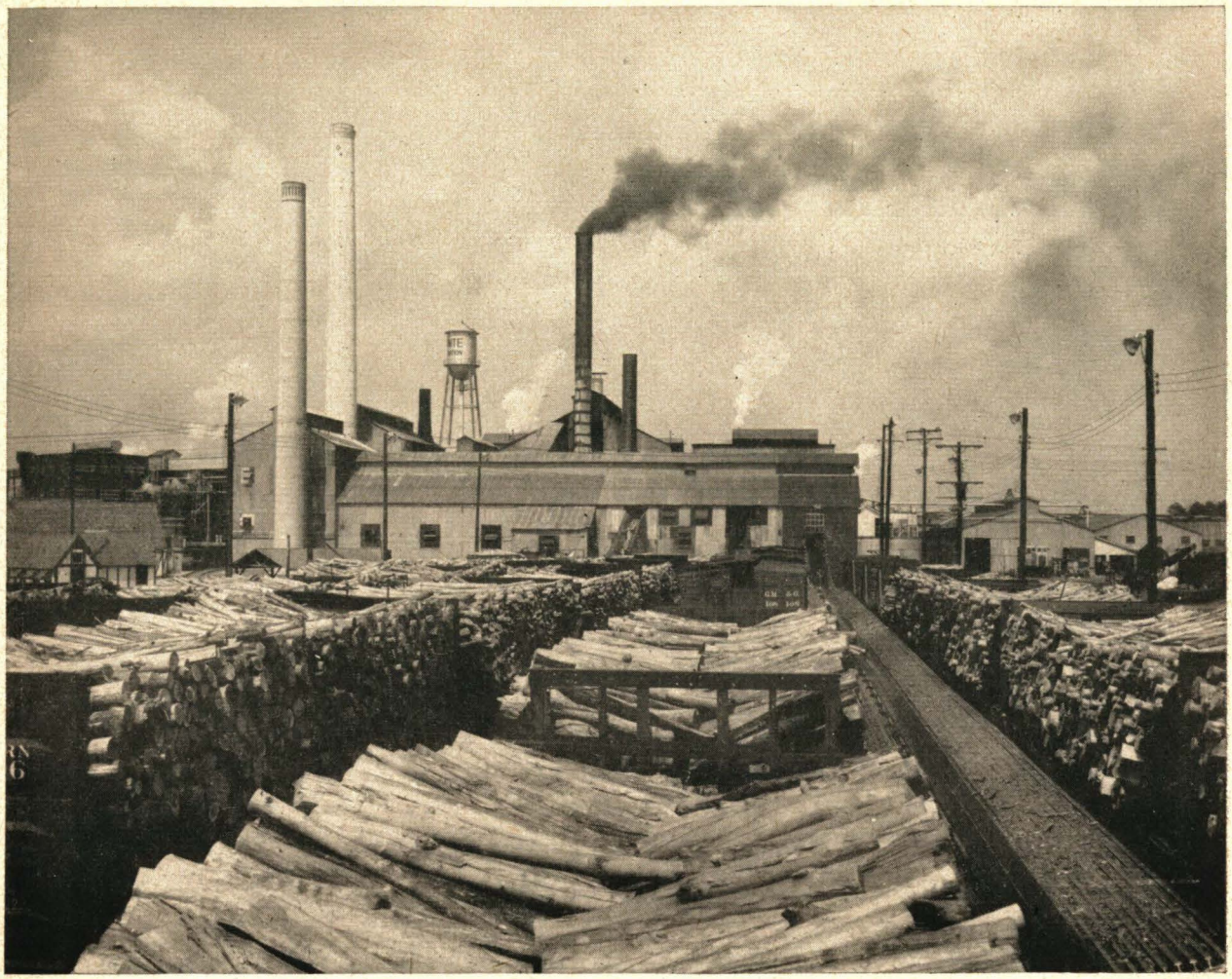

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FIGURE 45.—*Mississippi has shared with the other southern States in the phenomenal growth of the pulp industry.*

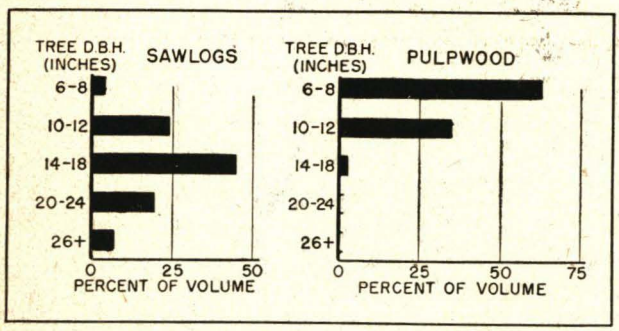

FIGURE 46.—*The sizes of pine trees that make up the cut in logging for sawlogs and pulpwood, 1947.*

of the tree in the woods. On the other hand, utilization of trees for pulpwood, fuel wood, poles and piling, and fence posts is more complete, particularly since cutting for these products frequently goes well into the tree tops and use is made of some cull trees.

Since softwood trees used for pulpwood yield substantially more volume than when they are used for sawlogs, the balancing of a large decline in softwood sawlog output with a large increase in softwood pulpwood has helped to sustain total timber output. In effect, the inventory of the forest resource has been increased by the change in output. Of course, the difference between pulpwood and sawlog cutting could be eliminated if pulpwood was taken from the tree tops commonly left in the woods by sawlog operators. But although this type of joint logging is growing in use, it still applies to only a small fraction of sawlog operations.

Outlook in Timber Production

THE FACT that the total output of products has been sustained at a fairly high level for at least three decades does not, in itself, insure a promising outlook. Industry has made adjustments in utilizing trees more completely, in utilizing trees of species, sizes, and qualities which were formely not marketable; and industry, forest landowners, and public agencies have made scattered efforts to increase timber growth and yields through better forest management. But in spite of these adjustments and efforts, the output of timber products could not be sustained except by depleting the forest resource. This raises some serious questions about forest industry's prospects in regard to its raw material.

WHAT IS THE OUTLOOK UNDER CURRENT TRENDS?

The outlook for raw material, of course, is not the same for all products. Some industries enjoy a stronger competitive position for timber than others; and size, quality, and species requirements give some timber users a larger resource to draw on than others. What will actually happen for individual products cannot be forecast here, but we can point out the present directions.

Two basic qualifications underlie the following discussion for individual products. One is that the same amount of improvement in forest management is assumed in the years ahead as in the years between the two Forest Surveys. The other is the assumption that forest industry needs to use timber of the same sizes, species, and quality that it uses now. These qualifications, it must be emphasized, are made to simplify the discussion; they are not intended as a forecast of what will happen. Accelerated improvement in forest management and less exacting requirements for raw timber material would make the outlook more favorable than is indicated here.

Lumber

Observations about the outlook for total timber production apply most strongly to lumber, since sawlogs comprise about half of the output of raw timber products.

Between the two Forest Surveys, when average softwood lumber manufacture amounted to 925 million board feet annually, sawlog volume of softwood species dropped 29 percent. If we assume that in the next 14-year period, an attempt is made to manufacture softwood lumber at about the 1947 level (some 900 million board feet), the decline in softwood growing stock will continue to be large and curtailed output will be unavoidable. This conclusion is reinforced by the realization that pulpwood competition for pine timber will be far stronger than it has been. Already, nearly 30 percent of the pine volume cut for sawlogs is in trees below 14 inches d. b. h., the same sizes in which pulpwood cutting is concentrated.

Hardwood sawlog volume did not decline between the two Surveys as much as softwood, but the better quality trees and more desired species have been depleted much faster than the 20-percent decline in hardwood sawlog volume indicates. In terms of the usable resource for sawlogs under present standards of utilization, the decline in hardwood sawlog volume may be even greater than the drop in softwood. The picture for hardwood lumber is clouded further by the fact that current hardwood lumber manufacture (509 million board feet in 1947) is about one-fourth more than it averaged between the two Surveys. If we think in terms of sustaining the current level of lumber manufacture, the outlook for hardwood is no better than that for softwood.

Pulpwood

Two factors—the prospect of reduced timber inventory because of the great expansion in pulpwood production which has already occurred, and increasing competition for small trees with the lumber industry—may provide an effective brake to further expansion in pine pulpwood cutting. The generally well-managed pulp company lands are not extensive enough to produce more than part of recent pulpwood requirements.

The cutting of pulpwood, which occurs principally in trees 6 to 12 inches d. b. h., has not been enough to change the total softwood volume in these tree sizes between the Forest Surveys of 1932–35 and 1946–48.

However, current pulpwood production is twice as much as it averaged during the 14 years between the two Surveys. Even if softwood pulpwood output should remain stationary at the 1948 level of 1.2 million cords, the increase over the inter-Survey average annual production alone will be enough to cause the softwood inventory in 6- to 12-inch trees to go down about one-fifth in another 14 years.[10]

Perhaps more important to the future of pulpwood production in Mississippi is the fact that sawlog cutting for lumber has been moving steadily into the smaller tree sizes which are used for pulpwood. If the trend of softwood sawlog inventory continues downward at its current rate of at least two percent a year, an even larger proportion of sawlogs will come from small tree sizes, and competition between the pulp and lumber industries will become much sharper.

Veneer

Four-fifths of all veneer production is from sweetgum, black and tupelo gums, cottonwood, and yellow-poplar; and most of the production is from trees 16 inches d. b. h. and larger. The resource in these species and sizes is some 2,700 million board feet. Grade limitations cut down the resource which would be usable, by current standards, to no more than 1,750 million feet. To this inventory, probably less than 90 million feet a year are added in growth.

This resource might maintain the present level of drain for veneer (128 million board feet in 1946) for many years. But other industries, particularly lumber, compete for the same tree species, sizes, and grades, and in fact, take a far bigger annual cut out of them than does the veneer industry. The effect of this competition is seen in the declines in the number of hardwood trees 16 inches and larger between 1932–35 and 1946–48 (fig. 47). When it is realized also that declines have been even greater in the better tree grades and species which are used for veneer stock, the rapidity of depletion in the resource used for veneer becomes apparent.

Cooperage

The prospect as to the timber resource for slack cooperage is favorable, but whether production can be increased is another question. Hardwood inventory and growth might support further expansion of slack coop-

[10] Based on the assumptions of no change in the kind of timber used by industry and the amount of improvement in forest management, and considering the ingrowth from smaller tree sizes.

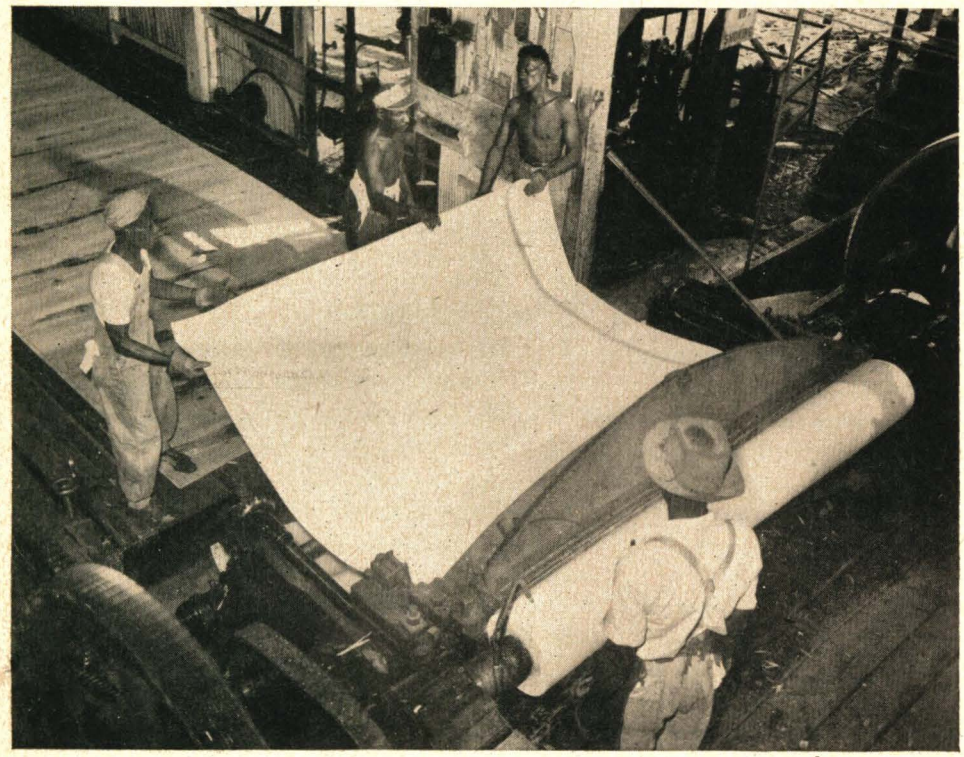

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FIGURE 47.—*Box veneer. The long-term trend of veneer-log production is upward, although the kind of timber now used is being rapidly depleted.*

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FIGURE 48.—*The timber supply outlook for slack cooperage depends on how well producers can compete with lumbermen and other hardwood users of the same kind of timber.*

erage manufacture, but cooperage producers will have to outbid lumbermen and other hardwood users for raw material (fig. 48). Slack cooperage users are in direct competition with other hardwood timber users for much of their timber, both in regard to tree size and tree quality.

The outlook for tight cooperage is less favorable. Some 1,200 million board feet of sawlog volume occurs in species of the white oak group in trees 18 inches d. b. h. and larger, but no more than 300 million feet is in species and quality acceptable for tight cooperage under present standards of utilization. In 1946, drain of all oak (mostly white oak) for tight cooperage was 50 million board feet, or about a sixth of the currently usable resource. Since other products also make inroads on the usable resource, there is a strong indication of short supply.

Naval Stores

The tremendous cut-back which occurred in Mississippi's gum naval stores industry with the cutting out of the virgin longleaf and slash pine in the 1920's may prove to be permanent. Despite technological improvements in naval stores operations in recent years, not much longleaf and slash pine is chipped within the State. The primary reason is that stands are not considered economical to operate under present conditions, although there are other reasons such as the shortage of skilled naval stores labor and the absence of a well-developed market in the area.

In regard to the wood naval stores industry based on the use of stumps of old-growth longleaf and slash pines, it is difficult to see how this can be other than a diminishing industry. The resource is estimated to be roughly 6 million tons, which is a 10- or 15-year supply at the present rate of use (fig. 49). Naval stores produced from waste liquors as a byproduct of pulp manufacture is another matter. As long as pulp mills manufacture pulp products, there is little question about their raw-material supply for a corresponding output of naval stores byproducts.

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FIGURE 49.—*At the present rate of use, the important wood naval stores industry can look forward to only a 10- to 15-year supply of old-growth pine stumps.*

Other Products

Producers of minor products with exacting timber requirements—such as handle stock, ski stock, and shuttle blocks—may have some difficulty in obtaining adequate timber supplies. Their ability to get needed timber may depend more on new growth in the particular species and quality required than on their ability to compete with other users of timber.

Fuel wood and minor timber items with unexacting species and quality requirements do not face a prospect of further decline on the basis of timber supply. In fact, the forests of Mississippi are oversupplied with those species, sizes, and grades not in demand for major products.

WHAT IS THE OUTLOOK UNDER IMPROVED MANAGEMENT?

The outlook for Mississippi's output of timber products can be improved by more intensive timber management.

A moderate level of management can be visualized—such as State-wide fire protection which would hold average annual burn to one percent; cutting practices which would build up and maintain the full capacity of the land to produce timber on a fourth of Mississippi's forest land (nearly a fourth of the forest is held by forest-products firms and public agencies alone); cutting practices which would improve current productivity of the rest of the forest; and planting on poorly stocked forest land. Such measures would reverse the trend in Mississippi's forests. Eventually, such management as this might be enough to raise the current annual growth of 1.8 billion board feet by two-thirds and the current growth of 529 million cubic feet by one-half.

If this level of management should be achieved, it would result in much more income and employment in timber-products industries than Mississippi now enjoys. Moreover, it would permit the State to contribute its share toward meeting the long-range

needs of the Nation for timber.[11] Whatever the practical difficulties, there is no problem in growth capacity. The art of timber management has gone well beyond the point where it can meet an annual growth goal of some 800 million cubic feet of total growth (48 cubic feet per acre) and 3 billion board feet of sawlog growth (181 board feet per acre) in Mississippi's forests.

Because of the current rapid decline in Mississippi's forest resource, it cannot be supposed that any attempt to meet a reasonable growth goal will be painless. Improved timber management implies, among other things, that more landowners will lighten their harvest cutting to insure prompt and full reproduction after cutting, or they will withhold timber from the market in order to grow more timber volume and higher-quality products. The effect will probably be to reduce drain in the short run, which will mean a corresponding decline in forest industry. If drain is not contracted, it is not likely that improvements in growth will be rapid enough to compensate for the rapid depletion of growing stock.

The reduction in drain, however, need be only temporary. As more good management is instituted, the forest growing stock and timber growth will increase. The approach to a goal of a sustained output of products aggregating 3 billion board feet of timber and corresponding volumes of employment and income could get under way. Any lesser goal will not satisfy Mississippi's needs nor the Nation's needs for adequate resources to maintain a prosperous economy.

[11] A long-range growth goal for the Nation has been estimated at 20 billion cubic feet of timber annually, including 72 billion board feet of saw timber. This is calculated to produce the amount of timber a prosperous nation might use if the supply were sufficient to keep forest products of a suitable kind and quality available at reasonable prices. The goal also includes a margin for irreducible losses, ineffective growth, new use, exports, and a backlog for national security. (See U. S. Dept. Agr. Misc. Pub. 668, FORESTS AND NATIONAL PROSPERITY, pp. 33–45).

Some Approaches to a Better Forest Situation

In view of the recent sharp decline in the forest resource, the present outlook is for contraction in some of Mississippi's important wood-using industries, reduced income for the people of the State, and inability of the State to contribute its share toward meeting national timber needs. The prospect is that products such as softwood lumber, standard hardwood lumber, veneer logs, and tight cooperage will be hit heaviest, but softwood pulpwood and other products may also go into decline.

The situation calls for immediate substantial improvements in timber management and utilization. Even a moderately good general level of timber management and efficient utilization may not avoid a temporary contraction in the output of some products, but at least the prospective reductions can be minimized while the forest begins recovery and a start is made toward timber abundance.

Mississippi's forest problems are centered on the 90 percent of the forest which is in private ownership. Although most of the large industrial holdings and some of the smaller properties are under good timber management, the general level of private forest management is poor. This could be deduced from inventory trends. It is also shown to be fact by a separate analysis of management practices—an examination of cutting practice, fire protection, and, in the south, grazing protection. Little more than a fourth of the forest held by Mississippi's 146,000 private landowners rates fair or better in respect to management; nearly three-fourths rates poor or worse.

Improved Utilization

Forest industry has made many adjustments leading to the use of smaller and poorer quality timber and less desired species. These adjustments will probably be carried much further. As the sawlog inventory shrinks, a larger proportion of the total cut may be taken from cordwood and small sawlog sizes. As the volume of higher grade timber shrinks, industry will need to accept more of the lower grade trees. As the more valuable species become less plentiful, industry faces the alternative of using less desired species. The shifts from pine to hardwood use that have occurred already do not help the forest situation much, since hardwood is declining at least as rapidly as pine in the grades and species demanded.

Integration of logging operations so as to utilize different parts of a tree for different products is a promising way of stretching out the resource. A case in point is combining pulpwood and sawlog operations in pine stands, so that the tree tops commonly left in the woods by sawlog operators are utilized for pulpwood. A year's accumulation of usable pine tops amounts to about a fifth of the total pulpwood output. At present this type of joint logging is practiced on only a small fraction of sawlog operations. Similarly, in hardwood stands, the resource can be extended by integrating the production of sawlogs and veneer logs with the output of smaller products like tie logs and slack cooperage bolts.

Products with exacting requirements can be given first call on timber of the requisite quality. Hardwood trees, suitable for quality veneer, need not be cut for sawlogs or cooperage bolts, and trees suitable for veneer, sawlogs, or cooperage bolts need not be taken for fuel wood.

Thinnings improve the spacing of crop trees and remove the trees least likely to develop into good timber. By concentrating the growth on the best trees, they are an important silvicultural tool. At the same time they suggest one of the best approaches toward extending the forest resource. Thinnings can provide a large volume of wood for pulpwood and minor products such as fuel wood, without reducing the inventory for more exacting products.

This opportunity is understood by the pulp companies, some of the large lumber companies, and other landowners, who use it profitably on their own lands.

Yet on most of the pulpwood operations in the State, nearly all the utilizable timber is taken. Such clear-cutting operations not only further the rapid decline in the forest resource; they cause resentment from forest landowners and the consequent drying up of many sources of wood for the pulp industry.

If all the avenues toward effective and complete utilization will be traveled more fully, the forest situation will be helped greatly. Nevertheless, fuller utilization is not the whole answer.

Improved Cutting Practice

The basic method for insuring adequate timber supplies is sound cutting practice supplemented by planting as needed—practices that will provide high, continuous timber yields. Anything short of this cannot meet industry's need. In general, these are the goals: In all stands, cut so as to insure some residual volume for subsequent growth and reproduction. In mixed stands, leave pine to reproduce, and reduce the proportion of hardwood. In hardwood stands, cut so as to reduce the proportion of less desired species and poor-quality trees. On most properties, reduce total drain below total growth.

Supervision of logging operations to insure that logging follows silvicultural principles, or at least contract limitations of cutting, is one of the surest ways of achieving satisfactory cutting practice. Yet technical foresters are employed, primarily by large wood-using firms, on only a tenth of the privately owned forest, and wholly unsupervised cutting is still the rule on more than half the forest. Where technical supervision of logging is not employed, cutting diameter limits sometimes reduce forest deterioration, at least in pine stands; but although diameter limits are used in half the logging contracts, they are frequently no more than an estimate of the limits of merchantability.

Some forest owners can provide effective supervision themselves; some can obtain free management assistance from public agencies or forest-products concerns; in other cases, technical forestry services must be hired. Where technical supervision cannot be provided because it is costly or unavailable, a moderate degree of supervision can still be exercised by the owners. Rapidly growing young stands need not be cut. Fuel wood and domestic-use cutting can be used to improve the forest; and in commercial logging, an adequate number of merchantable seed trees can be reserved.

Some minimum cutting practices have been set up in the Mississippi Forest Harvesting Act. This law states essentially that at least four 10-inch pine seed trees per acre or six 10-inch hardwood seed trees or one hundred 4-inch trees must be left standing after each cutting operation. These requirements are mild, insuring at best only fair cutting practice. They have already helped timber management measurably, and if fully observed, they could help considerably more.

Fire Control

Fire is very injurious to Mississippi's forest. It destroys seedlings and small trees. It kills or wounds larger trees and exposes them to damage from disease and insects. It has also been an important factor in eliminating pines from many upland stands and replacing them with hardwoods, which are usually of lower value on these sites.

A high standard of protection from fire is one of the imperative needs in forest management. Yet in Mississippi fire control on more than four-tenths of the privately held forest is rated no better than poor. Cooperative State-Federal fire control is extended to 51 counties (out of 82 in the State) which vote to help defray the cost by an annual levy of 2 cents per acre of forest land. Public fire control has been making rapid gains in recent years, but coverage is still insufficient, and financing is inadequate even in the protected counties.

Private efforts to control fire are much more limited. Owners of a large part of the forest make an effort to stop forest wildfires, but owners of only a tenth of the privately held forest make an effort to the extent of installing fire lanes, firebreaks, or other structures and equipment. The more elaborate methods of fire control are confined largely to the wood-using concerns which understand the direct connection between good forest protection and good timber management.

Grazing Control

Protection against grazing damage is often a factor to be weighed along with protection from fire, since unrestricted grazing may be as important as fire in limiting the establishment and early growth of stands. Hogs cause severe damage to pine seedlings and saplings by uprooting, girdling, and stripping tap or lateral roots. Sheep do their damage by repeated nipping of terminal buds. Cattle do not have a strong liking for pines, but they can do heavy damage to young hardwoods by trampling the trees or nipping the buds.

In most of the State, the law makes each stock raiser responsible for fencing in his own animals. However, in the counties of south Mississippi, where protection is needed most, the forest landowner enjoys no such benefit. Not many landowners, even those firmly persuaded of the worth of good management practice, can be expected to assume the burden of excluding other people's stock from their properties.

Prospects Under Better Forestry

The basic measures in forestry called for above—improved utilization, improved cutting practice, fire control, and protection from grazing—hold the key to Mississippi's forestry future. Instead of the present prospect for continued declines in the forest resource, with its corollary of curtailed industry, improved forestry would offer the prospect of a reversal in the trend of Mississippi's forests and an approach to timber abundance. Moderate but widespread improvements in utilization, cutting practice, and the control of fire and grazing could eventually raise the current annual growth of 1.8 billion board feet by two-thirds and the current growth of 529 million cubic feet by one-half. It would result in much more income and employment in timber-products industries than the State now enjoys, and permit the State to help meet the long-range needs of the Nation for timber.

Appendix

Definitions

The technical and uncommon terms used in this report, as well as certain common terms given special meaning, are defined in this section.

Forest Land

Forest land.—Land which bears forest growth, or land from which the forest has been removed and which has not been put to other use. Each tract classed as forest is at least one acre in size.

Commercial forest land.—Forest land which is (a) producing or physically capable of producing, usable crops of wood; (b) economically available now or prospectively; and (c) not withdrawn from timber utilization.

Reserved-commercial forest land.—Forest land in public parks or preserves which qualifies as commercial forest land except that it is withdrawn from commercial timber use through statute, ordinance, or administrative order.

Tree Groups

Softwoods.—Pine, principally loblolly (*Pinus taeda*), shortleaf (*P. echinata*), longleaf (*P. palustris*), and slash pine (*P. caribaea*). Also baldcypress, or "cypress" of the trade, (*Taxodium distichum* and *T. ascendens*) and redcedar (*Juniperus virginiana*).

Hardwoods.—Broad-leaved species, of which the most numerous groups or species are the white oaks (*Quercus,* subgen. *Lepidobalanus* spp.), red oaks (*Quercus,* subgen. *Erythrobalanus* spp.), hickories (*Carya* spp.), sweetgum (*Liquidambar styraciflua*), and black and tupelo gums (*Nyssa* spp.).

Forest Type

Forest type is determined only from dominant and codominant growing stock and dominant and codominant smaller sound trees of good form.

Loblolly-shortleaf pine.—Stands in which pines comprise at least 25 percent of the trees, and at least half of the pines are loblolly and shortleaf pines.

Longleaf-slash pine.—Stands in which pines comprise at least 25 percent of the trees, and at least half of the pines are longleaf and slash pines.

Cedar.—Stands in which eastern redcedar comprises at least 25 percent of the trees.

Bottom-land hardwood.—Stands in which bottom-land hardwoods and cypress comprise 76 percent or more of the trees.

Upland hardwood.—Stands in which upland hardwoods comprise 76 percent or more of the trees, and no pine is present.

Upland hardwood-pine.—Stands in which upland hardwoods comprise 76 percent or more of the trees, and some pine is present.

Class of Timber

Growing stock.—Sawlog growing stock is the sawlog portion of sawlog trees. Total growing stock includes sawlog growing stock, and upper stems of softwood sawlog trees and entire stems of cordwood trees to a minimum top diameter of 4 inches inside bark.

Sawlog tree.—A live, merchantable softwood 9.0 inches d. b. h. or larger, or a live, merchantable hardwood 11.0 inches d. b. h. or larger. To be merchantable, the tree must have at least a merchantable 12-foot butt log or 50 percent of its gross volume in merchantable logs.

Cordwood tree.—A live tree 5.0 inches d. b. h. or larger, which, though now smaller than sawlog size, would become a sawlog tree if it should grow to sawlog size.

Cull tree.—A live tree 5.0 inches d. b. h., or larger which, because of decay or sound defect, fails to meet the specifications for a cordwood or sawlog tree.

TOPS AND LIMBS.—Upper stems and limbs of hardwood sawlog trees between the top sawlog and a minimum diameter of 4 inches inside bark.

Stand-Size Class

LARGE SAW TIMBER.—Stands having a net volume of at least 1,500 board feet per acre in sawlog trees and at least half of this volume in softwoods 15.0 inches d. b. h. and larger and in hardwoods 17.0 inches d. b. h. and larger.

SMALL SAW TIMBER.—Stands which do not meet the specifications for large saw timber but which do contain a net volume of at least 1,500 board feet per acre in sawlog trees.

CORDWOOD.—Stands below saw-timber specifications, but with at least 10 percent of the growing space occupied by growing stock, and at least 5 percent of the growing space occupied by cordwood trees.

SEEDLING AND SAPLING.—Stands which do not meet saw-timber and cordwood specifications, but in which at least 40 percent of the growing space is occupied by growing stock and smaller sound trees of commercial species, and less than 10 percent of the space is occupied by growing stock alone.

RESTOCKING AND DENUDED.—Commercial forest land which does not qualify for any other stand-size class.

Tree Stocking

Degree of stocking is determined by the ratio of the actual number of growing-stock and smaller sound trees of good form in the stand to the number of trees of the same size required to occupy the site fully for best growth. Under this criterion, stands are well stocked when the percentage of full stocking is 70 or above, medium stocked when the percentage is 40 to 69, poorly stocked when the percentage is 10 to 39, and nonstocked when the percentage is under 10.

Volume and Basal Area

SAWLOG VOLUME.—Net volume in merchantable sawlogs in sawlog trees, measured by the International ¼-inch log rule.

TOTAL VOLUME.—Volume of sound, usable wood in stems of softwoods and stems and branches of hardwoods between stump and minimum top diameter of 4 inches inside bark, measured in cubic feet.

BASAL AREA.—Cross-sectional area of trees at breast height, measured in square feet.

Diameter

D. B. H. (DIAMETER BREAST HIGH).—Tree diameter in inches, outside bark, measured at 4½ feet above ground.

DIAMETER CLASS.—Each 2-inch diameter class includes diameters 1.0 inch below and 0.9 inch above the stated midpoint. E. g., the 12-inch class includes trees from 11.0 through 12.9 inches.

Growth

CURRENT ANNUAL NET GROWTH.—The change during the inventory year in net volume of the primary growing stock on commercial forest land resulting from natural causes, exclusive of catastrophic losses.

Drain

Net volume removed from timber growing stock through cutting of timber commodities and attendant logging waste, and through land clearing.

Tree Grades for Softwoods

GRADE 1 (SMOOTH TREES).—Not less than 20 feet of clear bole and at least 40 percent of the merchantable length clear of limbs and knots in sections not less than 8 feet in length.

GRADE 2 (LIMBY TREES).—Not less than 12 feet of clear bole and 25 to 39 percent of the merchantable length clear of limbs and knots in sections not less than 8 feet in length.

GRADE 3 (ROUGH TREES).—Merchantable trees below grade–2 specifications.

Log Grades for Hardwoods [12]

GRADE 1.—Logs having ⅚ or more of their length on the 3 best faces in clear-cuttings not less than 3 feet long; they yield at least 65 percent of their volume in No. 1 Common and better grades of lumber.

GRADE 2.—Logs having ⅔ to ⅚ of their length on the 3 best faces in clear-cuttings not less than 3 feet long; they yield at least 40 percent of their volume in No. 1 Common and better grades of lumber.

GRADE 3A.—Logs below grade 2, having ½ or more of their length on the 3 best faces in clear-cuttings not less than 2 feet long; they yield at least 13 percent of their volume in No. 1 Common and better grades of lumber.

GRADE 3B.—Logs which do not meet the clear-cutting requirements of 3A or higher grades, but which

[12] For detailed external specifications of log grades used, see INTERIM SAWLOG GRADES FOR SOUTHERN HARDWOODS. South. Forest Expt. Sta. 9 pp., illus. [Processed.] Rev. 1948.

are sound, reasonably straight, and without large knots or knot clusters; they are suitable for ties and low-grade structural timbers.

Stand Quality

FAIR AND BETTER.—A stand in which grade 2 or better hardwood logs or softwood trees are present.

POOR.—A stand in which no grade 2 hardwood logs or softwood trees are present.

THE FIELD SURVEY AND ITS ACCURACY

Forest Land Area and Timber Volume

An average of 14 years elapsed between the two Forest Surveys of Mississippi, though the interval varied for the different regions of the State.

The 1946–48 data on forest acreage and timber volumes are based on a forest-nonforest dot classification made on aerial photographs and on ground classification and measurement of quarter-acre sample plots located in a square pattern over the State. In 55 counties, pairs of plots were located every 3 miles on lines 3 miles apart; in the other 27 counties, the spacing was 4.2 miles.

The accuracy of the Forest Survey estimates may be affected by two types of error. The first type stems from use of a sample to estimate the whole and from variability of the item being sampled. This type is termed sampling error; it is susceptible to a mathematical evaluation of the probability of error. The second type of error derives from human mistakes in measurement, judgment, arithmetic, or recording, and from limitations of method or equipment.

Methods for calculating the effect of this second type of error—often referred to as reporting and estimating error—have not been developed. Reporting and estimating error can, however, be held to a minimum by training, good supervision, checking, and emphasis on careful work. This the Forest Survey constantly attempts to do.

Statistical analysis of the data, using random-sampling formulas, indicates a sampling error of 0.5 percent for the State estimate of total forest acreage, 2.1 percent for total growing stock, and 2.6 percent for sawlog growing stock. Because the volume estimates are derived from a systematic sample, and tests indicate that systematic sampling is more generally efficient than a random sample of the same size, the estimates of volume sampling error may be considered as setting an upper limit of error, rather than as expressing the actual probability of error.

As the State total acreage and volumes are broken down by Survey region, county, forest type, species, and other subdivisions, the possibility of error increases and is greatest for the smallest items. The order of this increase is suggested in table 5.

TABLE 5.—*Approximate sampling error to which Survey estimates of Mississippi's commercial forest acreage, total growing stock, and sawlog growing stock may be liable* [1]

Commercial forest		Growing stock		Sawlog growing stock	
Area	Sampling error	Total	Sampling error	Total	Sampling error
Thousand acres	*Percent*	*Million cubic feet*	*Percent*	*Million board feet*	*Percent*
16,500	0.5	7,500	2.1	29,000	2.6
10,000	.6	5,000	2.6	20,000	3.2
5,000	.9	2,500	3.7	10,000	4.4
2,000	1.4	1,000	5.8	4,000	7.0
500	2.9	300	10.6	1,000	14.1
50	9.1	30	33.6	100	44.5

[1] Liable on a probability of 2 chances out of 3. The figures were obtained by averaging out the areas with 3-mile and those with 4.2-mile plot spacing, and by averaging out the differences in forest variability over the State. They may therefore apply only approximately to any breakdown of a State total.

In computing the changes that took place between 1932–35 and 1946–48, the data from the first Forest Survey were adjusted to make them as closely comparable as possible to data from the second Survey. This was necessary because of certain basic differences between the two sets of data. For example, published estimates from the first Survey were based on a then official figure of 29,671,680 acres of total land area in Mississippi. This has since been superseded by a revised figure of 30,348,800 acres (from the Bureau of Census AREAS OF THE UNITED STATES, 1940), based on more accurate measurement. Thus, while actual land acreage has changed little if at all, the estimate of land acreage has increased 2.3 percent, affecting forest-area and timber-volume estimates in like proportion.

Again, the boundaries of some of the Survey regions were changed between the two Surveys, so as to put all boundaries on county lines for convenience in compilation. Yet again, the lower diameter limit for hardwood sawlog trees was dropped from 13.0 inches d. b. h. on the first Survey to 11.0 inches on the second Survey, in line with changing utilization practices. In addition to these major points, there were a number of procedural differences between the two Surveys that were taken into account. In every case, the data from the first Survey were adjusted to conform to the standards of the second Survey before change was computed.

The sampling error in the data on change in forest acreage and timber volume cannot be estimated. In the 1932–35 Survey, sample plots were spaced one-eighth mile apart on lines 10 miles apart; an estimate of sampling error was not made. Sampling error in the State forest acreage estimate of the first Survey was probably very small, as it is for the second Survey; and the indicated change in total forest acreage may be considered essentially correct. Indicated changes for Survey regions and other portions of the total acreage should be valued in proportion to the magnitude of the item and of the change. Changes in timber volume, because of the possible effect of nonsampling as well as sampling errors, are shown only for major groupings of the data.

Growth

Gross growth estimates are based on radial-growth measurements of mechanically sampled trees on Forest Survey plots. Measured growth over the past 10 years was used for projecting growth 10 years ahead. The difference between present and projected volume of the sample trees was reduced to an average annual percentage increase and applied directly to the current inventory volume. Net growth was calculated by subtracting from gross growth an allowance for mortality based on the plot inventory of trees that had died in the previous 4 years. No attempt was made to calculate sampling error in the growth estimates.

Production and Drain

Location of forest-products plants and cutting operations, movement of timber products to plants, and production except for items of domestic use were determined from a 100-percent canvass of wood-using industries. Output of fuel wood, fence posts, and other items of domestic use was estimated from an area sample of producers.

Data on production of each commodity were converted to terms of drain upon timber growing stock by using drain-to-production ratios derived from measurements taken in 1947 on 104 quarter-acre sample plots on logging operations throughout the State. The plots were selected by products roughly in proportion to 1946 drain. Their location was controlled to insure geographic coverage of each product, but within each locality plots were chosen at random. With few exceptions, plots were taken on going operations so that products could be measured and their volume assigned to the particular trees from which they were cut.

The sampling error to which the State total cubic-foot drain estimates are liable, on a probability of two chances out of three, is as follows for each commodity.

Commodity:	*Sampling error in cubic-foot drain (percent)*
Sawlogs	3.2
Fuel wood	12.0
Pulpwood	3.1
Hewn ties	2.5
Cooperage bolts	6.9
Veneer logs	5.9
Poles	.1
Fence posts	15.8
Piling	.1
Miscellaneous products	13.0
Miscellaneous domestic use	49.8
All commodities	2.6

Forest-land Ownership and Management

Forest-land acreage held by public agencies was determined by correspondence with the agencies concerned.

To determine how much forest land is held by different classes of private owners, three sample units of four sections of four square miles each were chosen at random in each county. The name and occupation of the owner and the acreage and boundaries of every parcel of land over two acres in size in the sample units were obtained from county courthouse records and transferred to aerial photographs. Forest area for each owner was calculated from the photographs and expanded from a sample unit to a county-area basis. Number of owners by owner-occupation class was determined by counting all owners in each class whose northeasternmost property corner fell within sample-unit boundaries and by expanding the count for each class from a sample unit to a county-area basis.

Statistical tests of the acreage estimates indicate a sampling error, on a probability of two chances out of three, of 2 percent for the largest class of owners and no more than 12 percent for the smallest class of owners. Estimates of numbers of owners are subject to the probability of greater error: 4 percent for the class with the most numerous owners, 57 percent for the class with the fewest owners.

To inquire into management practices, the factors influencing them, and ways to achieve improvements, some 1,000 owners were selected for sampling from among the owners with forest land in the sample units.

These owners were selected, first, by grouping owners by the more important occupation classes (using

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FIGURE 50. — *Fair cutting practice. Given fire protection, there will be no decline in the species composition of trees or the percentage of stocking 10 years after cutting as compared with the stand before cutting.*

preliminary classifications made by county officials on the basis of their personal knowledge), and second, by selecting a number of owners from each class so as to obtain optimum allocation of the sample to owner-occupation classes. Once the number of owners in each class to be sampled was determined, specific owners were chosen at random.

Management practices were inspected on the ground, usually after the owner was interviewed. In this inspection, the whole forest property was considered, not merely the portion within sample-unit boundaries. Management was rated on the basis of cutting practices (including related silvicultural measures) and fire protection—with the modification that in south Mississippi grazing damage to tree seedlings and saplings was evaluated along with fire damage.

On each property sampled the most recent cutting within the last 10-year period was appraised. The general principle was to judge whether this cutting (together with silvicultural measures accompanying it) would improve the stand, maintain it, or cause deterioration. The emphasis was not on the stand that was left, but on the anticipated changes in stocking and species composition of the growing stock (including

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FIGURE 51.—*Good cutting practice. In this stand it appears that stocking will increase in the 10 years after cutting. If the owner undertook special measures needed on his property such as planting open areas and removing undesirable hardwoods, his practice would have been classed excellent.*

established reproduction) in the 10 years following cutting.

The critical point in the range of cutting practice was taken to be that at which a stand, if adequately protected from fire, is barely maintained in stocking and in species composition. Cutting which met at least this minimum standard was classified into three grades—fair, good, and excellent, the last named applying to cutting that brings into play the full productive capacity of the land. Cutting which fell below the minimum standard was classed as poor, very poor, or destructive. (See figs. 50, 51, and 52.)

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FIGURE 52.—*Very poor cutting practice. Except for a few widely scattered seed trees, all merchantable pine sawlog timber was removed from this stand. If the few remaining seed trees had been removed, this cutting would have been classed destructive.*

The appraisal of fire protection on each owner's property was based on efforts made by the individual owner or the State to control fires, and on the effectiveness of protection as measured by average annual burn. All wildfire was considered undesirable. Average annual burn applied to the past 10 years unless tenure of the present owner or the period of protection was shorter, in which case the actual tenure or period of protection was used. If the individual owner plowed protective lanes or roads around and through his forest land, fought fire, or hired others to fight fire on his land, he was credited with effort in fire protection.

The critical point in the range of fire-protection classification was taken to be that at which the average annual burn was less than 10 percent where control efforts were made, or less than 5 percent where no control efforts were made.[13] Properties which met at least these minimum standards of effort and effec-

[13] These percentages were set higher than the customary standards for a wide area because a larger proportion of an individual property where fire occurs may be expected to burn in a given period than would be the case for a wide area.

A higher percentage is allowed for properties where control effort is made than for those where no effort is made in order to give credit for such effort when fires occur. Because a protected property could be expected to have a lower percentage burn than an unprotected property when subjected to the same fire occurrence, the latter should be required to show a better experience record than the former to qualify for an equal rating.

tiveness were classified into three grades—fair, good, and excellent. The excellent grade applied where protection effort included the building of access roads, the use of special fire-fighting equipment and fire-fighting crews, and where annual burn was less than 2 percent. Protection which fell below the minimum standards of effort and effectiveness was likewise classified into three grades—poor, very poor, and destructive.

Cutting practice and protection classifications for each property were combined into a single management rating in this way: If cutting and protection were classed the same for a particular property, then management rating was the same; if cutting and protection were one class apart, management was rated the same as the poorer of the two classes; if cutting and protection were two classes apart, management rating was intermediate.

TABLE 6.—*Land area of Mississippi, by Survey region, classified according to land use, 1946–48*

Land use	State	North	Central	South	Delta
	Thousand acres	*Thousand acres*	*Thousand acres*	*Thousand acres*	*Thousand acres*
Forest: [1]					
Commercial	16,508.9	3,715.0	6,007.6	4,745.9	2,040.4
Reserved-commercial	23.6	7.9	12.4	.5	2.8
Total	16,532.5	3,722.9	6,020.0	4,746.4	2,043.2
Farm nonforest: [2]					
Cropland in use	6,585.9	1,944.0	1,655.2	685.6	2,301.1
Idle and fallow	850.4	252.1	339.8	99.1	159.4
Pasture	4,232.4	1,749.4	1,777.3	282.8	422.9
Other farm	1,000.8	419.6	262.7	66.5	252.0
Total	12,669.5	4,365.1	4,035.0	1,134.0	3,135.4
Other nonforest	1,146.8	308.2	243.8	308.4	286.4
All land	30,348.8	8,396.2	10,298.8	6,188.8	5,465.0

[1] No forest land was classed noncommercial because of its incapacity to produce commercial timber.
[2] Based on 1945 Census of Agriculture.

TABLE 7.—*Commercial and reserved-commercial forest land area for Mississippi, by class of ownership, 1946–48*

Ownership	Commercial forest		Reserved-commercial forest	
	Thousand acres	*Percent*	*Thousand acres*	*Percent*
Private:				
Cotton, general, and cotton-vegetable farmer [1]	4,400.4	26.7		
Other farmer	2,588.0	15.7		
Businessman, housewife, wage earner, and professional worker	5,077.2	30.7		
Lumber company	1,162.6	7.0		
Pulp company	548.2	3.3		
Sawmill-farmer	275.8	1.7		
Concentration-yard owner	224.2	1.4		
Naval stores company	33.0	.2		
Other forest industry	48.5	.3		
Real estate company and land speculator	121.2	.7		
Miscellaneous	306.3	1.9		
Total	14,785.4	89.6		
Public:				
National forest	1,034.7	6.3	0.6	2.5
Soil Conservation Service	70.3	.4		
Fish and Wildlife Service	30.0	.2		
Other Federal	[2] 89.5	.5	11.2	47.5
State University and colleges	29.1	.2		
Other State	55.1	.3	11.8	50.0
County	414.8	2.5		
Total	1,723.5	10.4	23.6	100.0
All ownership	16,508.9	100.0	23.6	100.0

[1] Farm woodland, as classified by the Bureau of the Census, totals 6.9 million acres in Mississippi.
[2] 10,000 acres of this total are held by the Indian Service.

TABLE 8.—*Commercial forest land area for Mississippi, by Survey region and class of ownership, 1946–48*

Ownership	State	North	Central	South	Delta
	Thousand acres	*Thousand acres*	*Thousand acres*	*Thousand acres*	*Thousand acres*
Private:					
Cotton, general, and cotton-vegetable farmer [1]	4,400.4	1,396.7	1,433.1	1,018.6	552.0
Other farmer [1]	2,588.0	388.5	1,265.6	598.2	335.7
Businessman, housewife, wage earner, and professional worker	5,077.2	1,303.1	1,505.9	1,572.7	695.5
Lumber company	1,162.6	82.8	496.8	400.0	183.0
Pulp company	548.2	----	360.9	180.3	7.0
Sawmill-farmer	275.8	71.9	101.8	33.0	69.1
Concentration-yard owner	224.2	141.1	73.1	10.0	----
Other forest industry	81.5	----	----	53.0	28.5
Real estate company and land speculator	121.2	8.2	54.2	50.0	8.8
Miscellaneous	306.3	45.0	94.1	124.8	42.4
Total	14,785.4	3,437.3	5,385.5	4,040.6	1,922.0
Public:					
National forest	1,034.7	121.3	360.2	494.3	58.9
County	414.8	40.1	185.4	142.0	47.3
Other public	[2]274.0	116.3	76.5	69.0	12.2
Total	1,723.5	277.7	622.1	705.3	118.4
All ownership	16,508.9	3,715.0	6,007.6	4,745.9	2,040.4

[1] Farm woodland, as classified by the Bureau of the Census, totals 6.9 million acres in Mississippi—2.1 million acres in the North region, 2.7 million acres in the Central region, 1.2 million acres in the South, and 0.9 million acres in the Delta.

[2] The Indian Service holds 10,000 acres of this total—9,900 acres in the Central region, and 100 acres in the South.

TABLE 9.—*Commercial forest land area for Mississippi, by stand size and class of ownership, 1946–48*

Ownership	All stands	Saw timber	Cordwood	Other
	Thousand acres	*Thousand acres*	*Thousand acres*	*Thousand acres*
Private:				
Cotton, general, and cotton-vegetable farmer	4,400.4	1,354.1	2,005.9	1,040.4
Other farmer	2,588.0	974.7	926.8	686.5
Businessman, housewife, wage earner, and professional worker	5,077.2	1,649.7	2,063.3	1,364.2
Lumber company	1,162.6	509.1	311.7	341.8
Pulp company	548.2	300.4	153.1	94.7
Sawmill-farmer	275.8	119.3	117.6	38.9
Concentration-yard owner	224.2	84.4	108.6	31.2
Other forest industry	81.5	30.4	24.9	26.2
Real estate company and land speculator	121.2	42.5	41.6	37.1
Miscellaneous	306.3	92.1	122.6	91.6
Total	14,785.4	5,156.7	5,876.1	3,752.6
Public:				
National forest	1,034.7	464.5	336.6	233.6
County	414.8	203.9	82.7	128.2
Other public	274.0	119.9	110.8	43.3
Total	1,723.5	788.3	530.1	405.1
All ownership	16,508.9	5,945.0	6,406.2	4,157.7

TABLE 10.—*Relationship of commercial forest land area to total land area of Mississippi, by county, 1946–48*

County	All land	Commercial forest		County	All land	Commercial forest	
	Thousand acres	*Thousand acres*	*Percent*		*Thousand acres*	*Thousand acres*	*Percent*
Adams	286.7	191.0	66.6	Lincoln	375.0	228.6	61.0
Alcorn	259.2	119.8	46.2	Lowndes	325.1	116.6	35.9
Amite	466.6	279.7	59.9	Madison	480.6	145.8	30.3
Attala	463.4	259.7	56.0	Marion	352.0	238.9	67.9
Benton	263.7	155.1	58.8	Marshall	454.4	150.7	33.2
Bolivar	586.9	126.4	21.5	Monroe	492.2	225.6	45.8
Calhoun	378.9	214.1	56.5	Montgomery	257.9	146.5	56.8
Carroll	408.3	191.7	47.0	Neshoba	363.5	204.2	56.2
Chickasaw	323.8	127.9	39.5	Newton	371.2	203.0	54.7
Choctaw	266.9	122.3	45.8	Noxubee	444.8	197.6	44.4
Claiborne	311.0	196.8	63.3	Oktibbeha	290.6	122.3	42.1
Clarke	446.1	314.3	70.5	Panola	450.6	182.9	40.6
Clay	265.0	105.7	39.9	Pearl River	530.0	399.5	75.4
Coahoma	364.8	85.5	23.4	Perry	417.9	350.9	84.0
Copiah	499.9	296.7	59.4	Pike	262.4	126.7	48.3
Covington	266.2	163.1	61.3	Pontotoc	320.6	132.3	41.3
DeSoto	305.9	64.8	21.2	Prentiss	267.5	113.7	42.5
Forrest	300.2	245.0	81.6	Quitman	263.7	88.4	33.5
Franklin	363.5	270.5	74.4	Rankin	512.0	337.1	65.8
George	307.8	274.5	89.2	Scott	393.6	239.6	60.9
Greene	465.9	405.6	87.1	Sharkey	279.0	157.9	56.6
Grenada	286.1	154.2	53.9	Simpson	375.7	241.3	64.2
Hancock	310.4	222.1	71.6	Smith	410.9	231.2	56.3
Harrison	374.4	314.5	84.0	Stone	286.7	257.1	89.7
Hinds	561.3	211.6	37.7	Sunflower	443.5	65.9	14.9
Holmes	489.0	178.6	36.5	Tallahatchie	412.2	163.8	39.7
Humphreys	262.4	97.6	37.2	Tate	263.0	69.2	26.3
Issaquena	265.6	167.4	63.0	Tippah	297.0	130.1	43.8
Itawamba	346.2	208.3	60.2	Tishomingo	288.6	173.9	60.3
Jackson	476.2	409.1	85.9	Tunica	293.1	113.5	38.7
Jasper	437.1	273.8	62.6	Union	270.1	96.0	35.5
Jefferson	332.8	196.6	59.1	Walthall	257.9	156.0	60.5
Jeff Davis	265.0	164.2	62.0	Warren	362.2	262.9	72.6
Jones	451.8	301.7	66.8	Washington	465.9	113.7	24.4
Kemper	484.5	305.0	63.0	Wayne	529.3	408.7	77.2
Lafayette	434.6	219.3	50.5	Webster	266.2	138.9	52.2
Lamar	320.0	267.7	83.7	Wilkinson	432.0	321.4	74.4
Lauderdale	461.4	308.8	66.9	Winston	387.8	233.7	60.3
Lawrence	277.1	167.3	60.4	Yalobusha	322.6	171.2	53.1
Leake	375.0	192.9	51.4	Yazoo	600.4	307.1	51.1
Lee	291.2	61.9	21.3				
Leflore	376.3	111.7	29.7	State	30,348.8	16,508.9	54.4

TABLE 11.—*Area of stand-size classes on commercial forest land in Mississippi, by forest type and Survey region, 1946–48*

STATE

Forest type	All stands	Large saw timber	Small saw timber	Cordwood	Seedling and sapling	Restocking and denuded
	Thousand acres	*Thousand acres*	*Thousand acres*	*Thousand acres*	*Thousand acres*	*Thousand acres*
Softwood types:						
Loblolly-shortleaf pine	5,174.3	439.8	1,631.0	2,074.8	652.9	375.8
Longleaf-slash pine	2,201.4	24.8	434.5	752.6	313.9	675.6
Cedar	51.8	----	----	14.7	9.0	28.1
Total	7,427.5	464.6	2,065.5	2,842.1	975.8	1,079.5
Hardwood types:						
Bottom-land hardwood	3,388.4	552.8	1,088.5	1,068.2	520.4	158.5
Upland hardwood	1,928.9	315.6	417.2	692.2	229.7	274.2
Upland hardwood-pine	3,764.1	333.6	707.2	1,803.7	532.3	387.3
Total	9,081.4	1,202.0	2,212.9	3,564.1	1,282.4	820.0
All types	16,508.9	1,666.6	4,278.4	6,406.2	2,258.2	1,899.5

NORTH

Softwood types:						
Loblolly-shortleaf pine	1,009.8	32.4	176.7	585.0	162.9	52.8
Cedar	17.7	----	----	----	----	17.7
Total	1,027.5	32.4	176.7	585.0	162.9	70.5
Hardwood types:						
Bottom-land hardwood	541.9	41.9	178.0	262.6	56.3	3.1
Upland hardwood	935.1	79.6	192.7	472.7	145.2	44.9
Upland hardwood-pine	1,210.5	19.4	117.8	781.3	235.0	57.0
Total	2,687.5	140.9	488.5	1,516.6	436.5	105.0
All types	3,715.0	173.3	665.2	2,101.6	599.4	175.5

CENTRAL

Softwood types:						
Loblolly-shortleaf pine	3,269.2	369.6	1,134.8	1,088.4	408.2	268.2
Longleaf-slash pine	135.6	9.5	33.8	50.1	21.9	20.3
Cedar	17.8	----	----	5.0	5.2	7.6
Total	3,422.6	379.1	1,168.6	1,143.5	435.3	296.1
Hardwood types:						
Bottom-land hardwood	701.9	248.0	227.7	194.6	15.4	16.2
Upland hardwood	445.8	131.5	129.4	114.1	40.5	30.3
Upland hardwood-pine	1,437.3	273.8	436.7	565.9	97.9	63.0
Total	2,585.0	653.3	793.8	874.6	153.8	109.5
All types	6,007.6	1,032.4	1,962.4	2,018.1	589.1	405.6

TABLE 11.—*Area of stand-size classes on commercial forest land in Mississippi, by forest type and Survey region, 1946–48*—Continued

SOUTH

Forest type	All stands	Large saw timber	Small saw timber	Cordwood	Seedling and sapling	Restocking and denuded
	Thousand acres	*Thousand acres*	*Thousand acres*	*Thousand acres*	*Thousand acres*	*Thousand acres*
Softwood types:						
Loblolly-shortleaf pine	853.3	33.0	311.2	374.9	81.8	52.4
Longleaf-slash pine	2,065.8	15.3	400.7	702.5	292.0	655.3
Total	2,919.1	48.3	711.9	1,077.4	373.8	707.7
Hardwood types:						
Bottom-land hardwood	543.1	50.8	195.5	198.4	55.7	42.7
Upland hardwood	246.3	3.9	5.7	19.3	29.6	187.8
Upland hardwood-pine	1,037.4	27.9	134.3	417.5	192.8	264.9
Total	1,826.8	82.6	335.5	635.2	278.1	495.4
All types	4,745.9	130.9	1,047.4	1,712.6	651.9	1,203.1

DELTA

Softwood types:						
Loblolly-shortleaf pine	42.0	4.8	8.3	26.5	----------	2.4
Cedar	16.3	----------	----------	9.7	3.8	2.8
Total	58.3	4.8	8.3	36.2	3.8	5.2
Hardwood types:						
Bottom-land hardwood	1,601.5	212.1	487.3	412.6	393.0	96.5
Upland hardwood	301.7	100.6	89.4	86.1	14.4	11.2
Upland hardwood-pine	78.9	12.5	18.4	39.0	6.6	2.4
Total	1,982.1	325.2	595.1	537.7	414.0	110.1
All types	2,040.4	330.0	603.4	573.9	417.8	115.3

TABLE 12.—*Commercial forest land area in Mississippi by degree of stocking, forest type, and Survey region, 1946–48*

STATE

Forest type	All stocking	Well stocked	Medium stocked	Poorly stocked	Nonstocked
	Thousand acres	*Thousand acres*	*Thousand acres*	*Thousand acres*	*Thousand acres*
Softwood types:					
Loblolly-shortleaf pine	5,174.3	2,145.3	1,947.7	970.8	110.5
Longleaf-slash pine	2,201.4	249.6	719.5	772.3	460.0
Cedar	51.8	5.9	14.0	31.9	----
Total	7,427.5	2,400.8	2,681.2	1,775.0	570.5
Hardwood types:					
Bottom-land hardwood	3,388.4	1,195.6	1,588.3	482.0	122.5
Upland hardwood	1,928.9	728.6	700.8	331.1	168.4
Upland hardwood-pine	3,764.1	1,220.0	1,649.9	728.2	166.0
Total	9,081.4	3,144.2	3,939.0	1,541.3	456.9
All types	16,508.9	5,545.0	6,620.2	3,316.3	1,027.4

NORTH

Softwood types:					
Loblolly-shortleaf pine	1,009.8	372.5	409.0	208.8	19.5
Cedar	17.7	----	----	17.7	----
Total	1,027.5	372.5	409.0	226.5	19.5
Hardwood types:					
Bottom-land hardwood	541.9	261.9	211.5	66.3	2.2
Upland hardwood	935.1	394.3	355.5	168.6	16.7
Upland hardwood-pine	1,210.5	382.2	613.7	209.2	5.4
Total	2,687.5	1,038.4	1,180.7	444.1	24.3
All types	3,715.0	1,410.9	1,589.7	670.6	43.8

CENTRAL

Softwood types:					
Loblolly-shortleaf pine	3,269.2	1,421.5	1,202.0	565.1	80.6
Longleaf-slash pine	135.6	11.5	73.7	36.6	13.8
Cedar	17.8	----	10.2	7.6	----
Total	3,422.6	1,433.0	1,285.9	609.3	94.4
Hardwood types:					
Bottom-land hardwood	701.9	314.8	266.4	104.5	16.2
Upland hardwood	445.8	183.9	184.8	63.5	13.6
Upland hardwood-pine	1,437.3	573.9	627.6	219.6	16.2
Total	2,585.0	1,072.6	1,078.8	387.6	46.0
All types	6,007.6	2,505.6	2,364.7	996.9	140.4

TABLE 12.—*Commercial forest land area in Mississippi by degree of stocking, forest type, and Survey region, 1946–48*—Continued

SOUTH

Forest type	All stocking	Well stocked	Medium stocked	Poorly stocked	Nonstocked
	Thousand acres	*Thousand acres*	*Thousand acres*	*Thousand acres*	*Thousand acres*
Softwood types:					
Loblolly-shortleaf pine	853.3	324.5	336.7	184.1	8.0
Longleaf-slash pine	2,065.8	238.1	645.8	735.7	446.2
Total	2,919.1	562.6	982.5	919.8	454.2
Hardwood types:					
Bottom-land hardwood	543.1	143.9	229.1	144.3	25.8
Upland hardwood	246.3	8.9	36.5	62.8	138.1
Upland hardwood-pine	1,037.4	222.0	374.0	299.4	142.0
Total	1,826.8	374.8	639.6	506.5	305.9
All types	4,745.9	937.4	1,622.1	1,426.3	760.1

DELTA

Softwood types:					
Loblolly-shortleaf pine	42.0	26.8	----------	12.8	2.4
Cedar	16.3	5.9	3.8	6.6	----------
Total	58.3	32.7	3.8	19.4	2.4
Hardwood types:					
Bottom-land hardwood	1,601.5	475.0	881.3	166.9	78.3
Upland hardwood	301.7	141.5	124.0	36.2	----------
Upland hardwood-pine	78.9	41.9	34.6	----------	2.4
Total	1,982.1	658.4	1,039.9	203.1	80.7
All types	2,040.4	691.1	1,043.7	222.5	83.1

TABLE 13.—*Area of saw-timber stands in Mississippi, by stand quality and forest type, and Survey region, 1946–48*

STATE

Forest type	All qualities	Fair or better	Poor
	Thousand acres	*Thousand acres*	*Thousand acres*
Softwood types:			
Loblolly-shortleaf pine	2,070.8	1,201.0	869.8
Longleaf-slash pine	459.3	176.5	282.8
Total	2,530.1	1,377.5	1,152.6
Hardwood types:			
Bottom-land hardwood	1,641.3	1,126.4	514.9
Upland hardwood	732.8	481.2	251.6
Upland hardwood-pine	1,040.8	578.8	462.0
Total	3,414.9	2,186.4	1,228.5
All types	5,945.0	3,563.9	2,381.1

NORTH

Softwood types: Loblolly-shortleaf pine	209.1	115.3	93.8
Hardwood types:			
Bottom-land hardwood	219.9	128.7	91.2
Upland hardwood	272.3	180.5	91.8
Upland hardwood-pine	137.2	65.9	71.3
Total	629.4	375.1	254.3
All types	838.5	490.4	348.1

CENTRAL

Softwood types:			
Loblolly-shortleaf pine	1,504.4	943.1	561.3
Longleaf-slash pine	43.3	30.5	12.8
Total	1,547.7	973.6	574.1
Hardwood types:			
Bottom-land hardwood	475.7	339.6	136.1
Upland hardwood	260.9	185.2	75.7
Upland hardwood-pine	710.5	391.6	318.9
Total	1,447.1	916.4	530.7
All types	2,994.8	1,890.0	1,104.8

TABLE 13.—*Area of saw-timber stands in Mississippi, by stand quality and forest type, and Survey region, 1946–48*—Continued

SOUTH

Forest type	All qualities	Fair or better	Poor
	Thousand acres	*Thousand acres*	*Thousand acres*
Softwood types:			
Loblolly-shortleaf pine	344.2	142.6	201.6
Longleaf-slash pine	416.0	146.0	270.0
Total	760.2	288.6	471.6
Hardwood types:			
Bottom-land hardwood	246.3	167.6	78.7
Upland hardwood	9.6	6.8	2.8
Upland hardwood-pine	162.2	90.4	71.8
Total	418.1	264.8	153.3
All types	1,178.3	553.4	624.9

DELTA

Softwood types: Loblolly-shortleaf pine	13.1		13.1
Hardwood types:			
Bottom-land hardwood	699.4	490.5	208.9
Upland hardwood	190.0	108.7	81.3
Upland hardwood-pine	30.9	30.9	
Total	920.3	630.1	290.2
All types	933.4	630.1	303.3

TABLE 14.—*Basal area per acre of growing stock*[1] *in Mississippi, by forest-type group, stand size, and tree diameter, 1946–48*

Diameter breast high (inches)	All types			Softwood			Bottom-land hardwood			Upland hardwood[2]		
	Saw-timber stands	Cordwood stands	Other stands	Saw-timber stands	Cordwood stands	Other stands	Saw-timber stands	Cordwood stands	Other stands	Saw-timber stands	Cordwood stands	Other stands
	Square feet	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*
2	4.4	3.9	4.1	5.5	4.3	4.0	2.6	3.6	6.6	4.5	3.5	3.0
4	5.8	6.2	4.0	7.5	7.3	3.9	4.0	5.3	4.9	5.3	5.3	3.7
6	6.0	6.9	1.5	7.9	9.1	1.6	4.4	6.0	1.4	4.8	4.9	1.4
8	7.4	6.9	1.1	9.3	7.5	1.1	6.0	7.3	1.7	6.1	6.4	.9
10	8.0	5.0	1.0	10.0	4.7	1.0	6.4	5.5	1.1	6.8	5.2	.9
12	8.7	3.1	.8	10.0	2.6	.7	7.4	3.4	1.1	7.9	3.5	.8
14	7.9	2.1	.5	7.9	1.6	.4	8.2	2.7	1.2	7.5	2.3	.4
16	5.9	1.3	.5	5.5	.8	.2	6.9	2.3	1.2	5.6	1.3	.4
18	4.6	.7	.3	3.5	.4	(3)	6.2	1.3	.9	4.7	.7	.3
20	3.1	.4	.2	2.0	.2	.1	4.4	.9	.8	3.5	.4	.1
22	2.1	.2	.1	1.2	.1	(3)	3.0	.4	.6	2.5	.2	(3)
24	1.4	.2	.1	.6	.1		2.7	.6	.5	1.4	.1	
26	.8	.1	.1	.3			1.5	.4	.3	.9	(3)	
28	.7	(3)	.1	.2			1.5	.1	.3	.6	.1	
30	.5	(3)		.1			1.2	.1		.4	(3)	
32	.2	(3)		(3)			.3			.3	(3)	
34	.2	(3)		.1			.4	.1		.2		
36	.3	(3)	(3)	(3)			.7			.3	(3)	.1
38	.1						.4					
40	.1						.3					
42												
46	(3)						.1					
48												
Total	68.2	37.0	14.4	71.6	38.7	13.0	68.6	40.0	22.6	63.3	33.9	12.0

[1] Includes sound, well-formed 2- and 4-inch trees.
[2] Includes the upland hardwood-pine type.
[3] Negligible.

TABLE 15.—*Basal area per acre of growing stock*[1] *and cull trees in Mississippi, by forest-type group and Survey region, 1946–48*

Forest type	State	North	Central	South	Delta
	Square feet	*Square feet*	*Square feet*	*Square feet*	*Square feet*
Softwood types:					
Growing stock	43.4	37.3	54.3	29.1	37.9
Cull trees	7.1	8.2	7.1	6.6	6.9
Total	50.5	45.5	61.4	35.7	44.8
Bottom-land hardwood:					
Growing stock	50.5	39.5	70.5	45.7	46.6
Cull trees	26.1	25.0	22.1	46.4	23.2
Total	76.6	64.5	92.6	92.1	69.8
Upland hardwood:[2]					
Growing stock	38.5	30.8	53.9	19.8	53.4
Cull trees	14.6	16.3	13.1	12.9	16.7
Total	53.1	47.1	67.0	32.7	70.1
All growing stock and cull trees	57.0	49.2	66.8	41.3	69.2

[1] Includes sound, well-formed 2- and 4-inch trees.
[2] Includes upland hardwood-pine.

TABLE 16.—*Distribution of total growing stock in Mississippi, by species within each forest type, 1946–48*

Species	All types [1]	Loblolly-shortleaf pine	Longleaf-slash pine	Bottom-land hardwood	Upland hardwood	Upland hardwood-pine
Softwood:	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Loblolly pine	18.6	42.9	3.4	1.2	----	7.3
Shortleaf pine	12.2	27.7	1.5	.1	0.3	6.9
Longleaf pine	5.0	1.0	48.1	.1	----	1.4
Slash pine	4.0	.6	38.6	.5	----	.8
Other pine	1.3	1.9	.1	1.4	----	1.5
Cypress	2.1	[2]	.2	8.4	.1	[2]
Cedar	.1	.1	----	[2]	.2	.1
Total	43.3	74.2	91.9	11.7	.6	18.0
Hardwood:						
Southern red, black, and scarlet oaks	5.5	4.4	2.4	.5	13.4	12.4
Cherrybark, Shumard, and northern red oaks	1.7	.8	----	1.1	4.8	3.5
Water oaks	5.8	1.7	.5	13.5	7.6	6.3
White oak	3.6	2.4	.3	----	9.7	9.4
Other white oaks	5.6	3.7	.8	7.8	6.9	8.3
Sweetgum	11.7	6.3	.4	16.7	21.3	17.2
Black and tupelo gums	4.6	2.0	2.4	9.6	3.9	5.0
Cottonwood	1.1	----	----	4.2	.3	[2]
Willow	1.8	.1	----	7.1	.1	.1
Pecan	1.4	[2]	----	5.7	----	.1
Other hickories	4.0	1.9	.3	2.4	10.8	8.7
Elms	2.2	.3	----	5.1	4.1	2.2
Red maple	.5	.2	[2]	1.0	.9	.8
Yellow-poplar	1.5	.7	.3	1.2	3.7	2.9
Sycamore	.7	[2]	----	1.8	1.5	.5
Ash	1.0	.1	----	2.8	1.2	.7
Beech	1.0	.3	----	1.0	3.7	1.7
Sweetbay and magnolia	1.1	.5	.6	2.1	1.3	1.2
Hackberry	.6	[2]	----	2.3	.3	.2
Other	1.3	.4	.1	2.4	3.9	.8
Total	56.7	25.8	8.1	88.3	99.4	82.0
All species	100.0	100.0	100.0	100.0	100.0	100.0

[1] Cedar type included.
[2] Negligible.

TABLE 17.—*Total growing stock in Mississippi, by species and Survey region, 1946–48*

Species	State	North	Central	South	Delta
	Million cubic feet	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*
Softwood:					
Loblolly pine	1,427.4	87.4	1,022.7	315.8	1.5
Shortleaf pine	935.3	266.0	542.1	113.0	14.2
Longleaf pine	384.9	----	68.3	316.6	----
Slash pine	308.2	----	1.8	306.4	----
Other pine	102.9	----	48.4	54.5	----
Cypress	163.7	14.9	32.0	8.3	108.5
Cedar	8.5	2.1	3.1	----	3.3
Total	3,330.9	370.4	1,718.4	1,114.6	127.5
Hardwood:					
Southern red, black, and scarlet oaks	422.6	145.0	193.3	62.7	21.6
Cherrybark, Shumard, and northern red oaks	127.2	20.8	82.0	5.6	18.8
Water oaks	453.7	54.5	196.5	65.8	136.9
White oak	273.8	82.0	143.5	32.7	15.6
Other white oaks	428.8	110.2	189.2	31.3	98.1
Sweetgum	900.0	167.2	524.1	74.6	134.1
Black and tupelo gums	355.8	25.4	145.7	138.7	46.0
Cottonwood	83.2	4.5	29.4	7.7	41.6
Willow	140.0	17.1	40.3	.4	82.2
Pecan	110.2	.9	21.2	.2	87.9
Other hickories	304.2	87.8	164.8	28.1	23.5
Elms	168.3	30.6	69.6	3.6	64.5
Red maple	40.6	9.4	18.9	6.3	6.0
Yellow-poplar	113.2	14.1	53.2	34.5	11.4
Sycamore	52.3	16.3	21.6	1.8	12.6
Ash	75.5	8.0	34.9	3.5	29.1
Beech	79.6	8.8	50.6	8.7	11.5
Sweetbay and magnolia	84.1	1.2	31.4	50.7	.8
Hackberry	49.8	4.7	13.3	2.2	29.6
Other	98.5	10.2	42.2	7.9	38.2
Total	4,361.4	818.7	2,065.7	567.0	910.0
All species	7,692.3	1,189.1	3,784.1	1,681.6	1,037.5

TABLE 18.—*Total cubic-foot volume of timber classes in Mississippi, by species and Survey region, 1946–48*

STATE

Species	All timber	Growing stock			Tops and limbs	Cull trees
		All trees [1]	Sawlog trees	Cordwood trees		
	Million cubic feet	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*
Softwood:						
Loblolly pine	1,465.1	1,427.4	927.4	282.9	----	37.7
Shortleaf pine	972.5	935.3	462.8	351.4	----	37.2
Longleaf pine	391.1	384.9	237.1	84.0	----	6.2
Slash pine	319.3	308.2	193.0	67.8	----	11.1
Other pine	109.6	102.9	72.5	14.0	----	6.7
Other softwood	185.5	172.2	127.5	12.2	----	13.3
Total	3,443.1	3,330.9	2,020.3	812.3	----	112.2
Hardwood:						
Red oaks	1,751.9	1,003.5	651.5	352.0	402.5	345.9
White oaks	1,215.8	702.6	400.2	302.4	248.3	264.9
Sweetgum	1,327.4	900.0	495.1	404.9	245.7	181.7
Black and tupelo gums	708.2	355.8	203.7	152.1	116.0	236.4
Other hardwood	3,108.1	1,399.5	918.2	481.3	546.1	1,162.5
Total	8,111.4	4,361.4	2,668.7	1,692.7	1,558.6	2,191.4
All species	11,554.5	7,692.3	4,689.0	2,505.0	1,558.6	2,303.6

NORTH

Softwood:						
Loblolly pine	96.5	87.4	46.7	27.1	----	9.1
Shortleaf pine	291.4	266.0	124.8	104.3	----	25.4
Other softwood	18.5	17.0	11.5	2.2	----	1.5
Total	406.4	370.4	183.0	133.6	----	36.0
Hardwood:						
Red oaks	395.4	220.3	132.5	87.8	80.2	94.9
White oaks	352.5	192.2	101.1	91.1	61.7	98.6
Sweetgum	278.1	167.2	84.5	82.7	42.3	68.6
Black and tupelo gums	67.5	25.4	13.6	11.8	8.6	33.5
Other hardwood	549.4	213.6	118.5	95.1	73.6	262.2
Total	1,642.9	818.7	450.2	368.5	266.4	557.8
All species	2,049.3	1,189.1	633.2	502.1	266.4	593.8

CENTRAL

Softwood:						
Loblolly pine	1,037.1	1,022.7	656.6	213.2	----	14.4
Shortleaf pine	548.5	542.1	268.3	209.0	----	6.4
Longleaf pine	68.9	68.3	44.8	14.0	----	.6
Slash pine	1.8	1.8	1.4	.2	----	----
Other pine	51.4	48.4	32.9	7.7	----	3.0
Other softwood	39.0	35.1	23.6	3.9	----	3.9
Total	1,746.7	1,718.4	1,027.6	448.0	----	28.3

See footnote at end of table.

TABLE 18.—*Total cubic-foot volume of timber classes in Mississippi, by species and Survey region, 1946–48*—Continued

CENTRAL—Continued

Species	All timber	Growing stock			Tops and limbs	Cull trees
		All trees [1]	Sawlog trees	Cordwood trees		
	Million cubic feet	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*
Hardwood:						
Red oaks	751.0	471.8	304.1	167.7	181.6	97.6
White oaks	489.3	332.7	171.9	160.8	98.6	58.0
Sweetgum	712.7	524.1	273.3	250.8	131.0	57.6
Black and tupelo gums	232.1	145.7	78.9	66.8	42.0	44.4
Other hardwood	1,112.7	591.4	381.1	210.3	222.9	298.4
Total	3,297.8	2,065.7	1,209.3	856.4	676.1	556.0
All species	5,044.5	3,784.1	2,236.9	1,304.4	676.1	584.3

SOUTH

Softwood:						
Loblolly pine	329.6	315.8	223.5	41.9	----------	13.8
Shortleaf pine	118.0	113.0	62.1	33.9	----------	5.0
Longleaf pine	322.2	316.6	192.3	70.0	----------	5.6
Slash pine	317.5	306.4	191.6	67.6	----------	11.1
Other pine	58.2	54.5	39.6	6.3	----------	3.7
Other softwood	12.2	8.3	6.0	.4	----------	3.9
Total	1,157.7	1,114.6	715.1	220.1	----------	43.1
Hardwood:						
Red oaks	277.6	134.1	79.2	54.9	54.6	88.9
White oaks	119.5	64.0	35.8	28.2	22.0	33.5
Sweetgum	126.2	74.6	43.0	31.6	21.8	29.8
Black and tupelo gums	320.5	138.7	77.3	61.4	46.9	134.9
Other hardwood	519.4	155.6	101.0	54.6	59.3	304.5
Total	1,363.2	567.0	336.3	230.7	204.6	591.6
All species	2,520.9	1,681.6	1,051.4	450.8	204.6	634.7

DELTA

Softwood:						
Loblolly pine	1.9	1.5	0.6	0.7	----------	0.4
Shortleaf pine	14.6	14.2	7.6	4.2	----------	.4
Other softwood	115.8	111.8	86.4	5.7	----------	4.0
Total	132.3	127.5	94.6	10.6	----------	4.8
Hardwood:						
Red oaks	327.9	177.3	135.7	41.6	86.1	64.5
White oaks	254.5	113.7	91.4	22.3	66.0	74.8
Sweetgum	210.4	134.1	94.3	39.8	50.6	25.7
Black and tupelo gums	88.1	46.0	33.9	12.1	18.5	23.6
Other hardwood	926.6	438.9	317.6	121.3	190.3	297.4
Total	1,807.5	910.0	672.9	237.1	411.5	486.0
All species	1,939.8	1,037.5	767.5	247.7	411.5	490.8

[1] Includes tops of softwoods.

TABLE 19.—*Total growing stock in Mississippi, by species, stand size, and Survey region, 1946–48*

STATE

Species	All stands	Large saw timber	Small saw timber	Cordwood	Seedling and sapling	Restocking and denuded
	Million cubic feet	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*
Softwood:						
Loblolly pine	1,427.4	221.3	935.3	247.3	15.7	7.8
Shortleaf pine	935.3	83.7	495.2	330.3	18.9	7.2
Longleaf pine	384.9	24.3	207.2	116.9	16.5	20.0
Slash pine	308.2	8.2	199.7	85.8	9.5	5.0
Other pine	102.9	22.3	74.0	6.6	----------	----------
Other softwood	172.2	54.0	93.3	15.1	5.6	4.2
Total	3,330.9	413.8	2,004.7	802.0	66.2	44.2
Hardwood:						
Red oaks	1,003.5	259.1	402.4	299.2	31.0	11.8
White oaks	702.6	134.6	301.6	241.3	18.9	6.2
Sweetgum	900.0	189.4	429.6	253.0	24.3	3.7
Black and tupelo gums	355.8	62.2	196.3	83.7	9.2	4.4
Other hardwood	1,399.5	354.2	681.5	304.7	41.4	17.7
Total	4,361.4	999.5	2,011.4	1,181.9	124.8	43.8
All species	7,692.3	1,413.3	4,016.1	1,983.9	191.0	88.0

NORTH

Softwood:						
Loblolly pine	87.4	9.3	38.8	38.1	1.1	0.1
Shortleaf pine	266.0	16.4	105.9	133.1	8.6	2.0
Other softwood	17.0	1.2	11.2	4.4	.1	.1
Total	370.4	26.9	155.9	175.6	9.8	2.2
Hardwood:						
Red oaks	220.3	33.5	71.4	111.2	4.1	0.1
White oaks	192.2	21.2	64.5	98.7	6.4	1.4
Sweetgum	167.2	21.8	67.6	73.1	4.2	.5
Black and tupelo gums	25.4	3.1	7.7	12.9	1.5	.2
Other hardwood	213.6	27.2	88.9	86.2	9.9	1.4
Total	818.7	106.8	300.1	382.1	26.1	3.6
All species	1,189.1	133.7	456.0	557.7	35.9	5.8

CENTRAL

Softwood:						
Loblolly pine	1,022.7	186.9	671.8	147.3	11.3	5.4
Shortleaf pine	542.1	59.2	314.0	157.5	8.0	3.4
Longleaf pine	68.3	13.7	35.8	15.8	2.9	.1
Slash pine	1.8	----------	1.8	----------	----------	----------
Other pine	48.4	17.0	28.3	3.1	----------	----------
Other softwood	35.1	13.8	19.4	1.5	.2	.2
Total	1,718.4	290.6	1,071.1	325.2	22.4	9.1

TABLE 19.—*Total growing stock in Mississippi, by species, stand size, and Survey region, 1946–48*—Continued

CENTRAL—Continued

Species	All stands	Large saw timber	Small saw timber	Cordwood	Seedling and sapling	Restocking and denuded
	Million cubic feet	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*
Hardwood:						
Red oaks	471.8	167.2	196.2	99.4	6.3	2.7
White oaks	332.7	79.1	152.7	93.8	5.2	1.9
Sweetgum	524.1	127.4	247.7	135.5	11.3	2.2
Black and tupelo gums	145.7	34.6	73.6	33.5	2.9	1.1
Other hardwood	591.4	218.1	268.9	93.2	9.3	1.9
Total	2,065.7	626.4	939.1	455.4	35.0	9.8
All species	3,784.1	917.0	2,010.2	780.6	57.4	18.9

SOUTH

Softwood:						
Loblolly pine	315.8	25.0	224.4	60.8	3.3	2.3
Shortleaf pine	113.0	6.2	67.4	35.3	2.3	1.8
Longleaf pine	316.6	10.6	171.4	101.1	13.6	19.9
Slash pine	306.4	8.2	197.9	85.8	9.5	5.0
Other pine	54.5	5.3	45.7	3.5	----	----
Other softwood	8.3	.1	.8	3.8	----	3.6
Total	1,114.6	55.4	707.6	290.3	28.7	32.6
Hardwood:						
Red oaks	134.1	13.2	53.0	54.5	7.3	6.1
White oaks	64.0	7.5	28.8	26.2	1.5	----
Sweetgum	74.6	12.3	37.6	21.3	2.6	.8
Black and tupelo gums	138.7	6.3	95.2	31.0	3.9	2.3
Other hardwood	155.6	21.7	84.0	41.8	4.3	3.8
Total	567.0	61.0	298.6	174.8	19.6	13.0
All species	1,681.6	116.4	1,006.2	465.1	48.3	45.6

DELTA

Softwood:						
Loblolly pine	1.5	0.1	0.3	1.1	----	----
Shortleaf pine	14.2	1.9	7.9	4.4	----	----
Other softwood	111.8	38.9	61.9	5.4	5.3	0.3
Total	127.5	40.9	70.1	10.9	5.3	.3
Hardwood:						
Red oaks	177.3	45.2	81.8	34.1	13.3	2.9
White oaks	113.7	26.8	55.6	22.6	5.8	2.9
Sweetgum	134.1	27.9	76.7	23.1	6.2	.2
Black and tupelo gums	46.0	18.2	19.8	6.3	.9	.8
Other hardwood	438.9	87.2	239.7	83.5	17.9	10.6
Total	910.0	205.3	473.6	169.6	44.1	17.4
All species	1,037.5	246.2	543.7	180.5	49.4	17.7

TABLE 20.—*Total growing stock in Mississippi, by class of ownership and species group, 1946–48*

Ownership	All species	Softwood	Hardwood
	Million cubic feet	*Million cubic feet*	*Million cubic feet*
Private:			
Cotton, general, and cotton-vegetable farmer	1,816.2	678.7	1,137.5
Other farmer	1,199.5	471.3	728.2
Businessman, housewife, wage earner, and professional worker	2,171.9	882.0	1,289.9
Lumber company	709.0	349.4	359.6
Pulp company	368.2	237.0	131.2
Other forest industry	300.8	124.1	176.7
Real estate company and land speculator	51.5	19.3	32.2
Miscellaneous	122.4	52.8	69.6
Total private	6,739.5	2,814.6	3,924.9
Public:			
National forest	572.0	407.5	164.5
County	236.2	48.5	187.7
Other public	144.6	60.3	84.3
Total public	952.8	516.3	436.5
All ownership	7,692.3	3,330.9	4,361.4

TABLE 21.—*Average cubic-foot volume per acre of total growing stock in Mississippi, by stand size and forest type, 1946–48*

Forest type	All stands	Large saw timber	Small saw timber	Cordwood	Seedling and sapling	Restocking and denuded
	Cubic feet	*Cubic feet*	*Cubic feet*	*Cubic feet*	*Cubic feet*	*Cubic feet*
Softwood:						
Loblolly-shortleaf pine	578	940	1,103	343	79	45
Longleaf-slash pine	315	948	964	267	80	35
Cedar	106	----------	----------	231	200	11
Average	497	940	1,073	322	81	38
Hardwood:						
Bottom-land hardwood	565	814	928	345	114	158
Upland hardwood	387	747	705	269	89	32
Upland hardwood-pine	357	871	699	285	61	35
Average	441	812	813	300	88	58
All types	466	848	939	310	85	46

TABLE 22.—*Average cubic-foot volume per acre of total growing stock in Mississippi, by Survey region and forest type, 1946–48*

Forest type	State	North	Central	South	Delta
	Cubic feet	*Cubic feet*	*Cubic feet*	*Cubic feet*	*Cubic feet*
Softwood:					
Loblolly-shortleaf pine	578	368	642	591	379
Longleaf-slash pine	315	----------	468	304	----------
Cedar	106	[1]	[1]	----------	[1]
Average	497	362	633	388	338
Hardwood:					
Bottom-land and hardwood	565	423	827	541	505
Upland hardwood	387	312	583	78	581
Upland hardwood-pine	357	245	542	227	420
Average	441	304	626	300	513
All types	466	320	630	354	508

[1] Sample too small to permit regional breakdown.

TABLE 23.—*Sawlog volume in Mississippi, by species and Survey region, 1946–48*

Species	State	North	Central	South	Delta
	Million board feet	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*
Softwood:					
Loblolly pine	5,734.7	284.4	4,064.5	1,382.2	3.6
Shortleaf pine	2,785.4	748.1	1,618.7	372.2	46.4
Longleaf pine	1,431.5	----------	280.2	1,151.3	----------
Slash pine	1,157.2	----------	9.4	1,147.8	----------
Other pine	454.3	----------	206.4	247.9	----------
Cypress	802.4	70.9	138.0	37.1	556.4
Cedar	13.6	4.6	6.2	----------	2.8
Total	12,379.1	1,108.0	6,323.4	4,338.5	609.2
Hardwood:					
Southern red, black, and scarlet oaks	1,538.2	575.2	635.4	215.1	112.5
Cherrybark, Shumard, and northern red oaks	595.1	86.2	399.7	27.2	82.0
Water oaks	2,089.9	185.0	939.3	272.5	693.1
White oak	1,143.0	328.1	604.5	131.3	79.1
Other white oaks	1,382.8	300.2	474.0	92.7	515.9
Sweetgum	3,112.7	524.6	1,716.0	271.1	601.0
Black and tupelo gums	1,262.1	83.0	487.6	480.0	211.5
Cottonwood	454.0	24.8	175.3	37.7	216.2
Willow	532.8	50.2	219.3	----------	263.3
Pecan	607.0	5.2	127.2	.9	473.7
Other hickories	1,175.4	301.1	638.7	132.8	102.8
Elm	664.4	116.5	206.9	9.4	331.6
Red maple	83.7	27.4	30.3	6.5	19.5
Yellow-poplar	499.5	45.8	242.1	145.9	65.7
Sycamore	214.1	60.0	99.7	2.7	51.7
Ash	294.5	21.9	110.0	20.9	141.7
Beech	462.1	43.0	302.0	48.8	68.3
Sweetbay and magnolia	364.7	.8	146.9	211.9	5.1
Hackberry	198.1	13.3	39.2	10.6	135.0
Other	274.8	31.1	96.3	13.5	133.9
Total	16,948.9	2,823.4	7,690.4	2,131.5	4,303.6
All species	29,328.0	3,931.4	14,013.8	6,470.0	4,912.8

TABLE 24.—*Sawlog volume in Mississippi, by species, diameter class, and Survey region, 1946–48*

STATE

Species	All diameters	10–12 inches,[1] d. b. h.	14–18 inches, d. b. h.	20–24 inches, d. b. h.	26+ inches, d. b. h.
	Million board feet	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*
Softwood:					
Loblolly pine	5,734.7	2,157.8	2,731.2	740.0	105.7
Shortleaf pine	2,785.4	1,579.2	958.8	204.1	43.3
Longleaf pine	1,431.5	754.5	610.4	41.0	25.6
Slash pine	1,157.2	550.7	497.7	108.8	----------
Other pine	454.3	138.2	258.2	57.9	----------
Other softwood	816.0	96.1	244.6	139.7	335.6
Total	12,379.1	5,276.5	5,300.9	1,291.5	510.2
Hardwood:					
Red oaks	4,223.2	664.9	1,936.9	957.3	664.1
White oaks	2,525.8	501.8	1,188.5	542.9	292.6
Sweetgum	3,112.7	638.3	1,824.1	514.6	135.7
Black and tupelo gums	1,262.1	269.1	686.7	235.4	70.9
Other hardwood	5,825.1	887.9	2,897.8	1,480.5	558.9
Total	16,948.9	2,962.0	8,534.0	3,730.7	1,722.2
All species	29,328.0	8,238.5	13,834.9	5,022.2	2,232.4

NORTH

Softwood:					
Loblolly pine	284.4	124.9	124.4	35.1	----------
Shortleaf pine	748.1	422.2	235.3	79.4	11.2
Other softwood	75.5	15.0	10.5	18.1	31.9
Total	1,108.0	562.1	370.2	132.6	43.1
Hardwood:					
Red oaks	846.4	186.8	436.9	138.3	84.4
White oaks	628.3	159.8	311.0	110.0	47.5
Sweetgum	524.6	132.5	308.4	83.7	----------
Black and tupelo gums	83.0	33.7	32.4	9.0	7.9
Other hardwood	741.1	164.9	401.3	148.9	26.0
Total	2,823.4	677.7	1,490.0	489.9	165.8
All species	3,931.4	1,239.8	1,860.2	622.5	208.9

CENTRAL

Softwood:					
Loblolly pine	4,064.5	1,539.8	1,836.8	592.1	95.8
Shortleaf pine	1,618.7	906.7	582.2	97.7	32.1
Longleaf pine	280.2	106.7	129.0	36.6	7.9
Slash pine	9.4	----------	----------	9.4	----------
Other pine	206.4	67.9	104.5	34.0	----------
Other softwood	144.2	36.0	62.5	13.4	32.3
Total	6,323.4	2,657.1	2,715.0	783.2	168.1

See footnote at end of table.

TABLE 24.—*Sawlog volume in Mississippi, by species, diameter class, and Survey region, 1946–48*—Continued

CENTRAL—Continued

Species	All diameters	10–12 inches,[1] d. b. h.	14–18 inches, d. b. h.	20–24 inches, d. b. h.	26+ inches, d. b. h.
	Million board feet	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*
Hardwood:					
Red oaks	1,974.4	288.7	923.2	451.4	311.1
White oaks	1,078.5	239.8	567.3	211.9	59.5
Sweetgum	1,716.0	359.6	1,019.5	278.0	58.9
Black and tupelo gums	487.6	104.7	265.9	92.2	24.8
Other hardwood	2,433.9	359.5	1,149.8	658.3	266.3
Total	7,690.4	1,352.3	3,925.7	1,691.8	720.6
All species	14,013.8	4,009.4	6,640.7	2,475.0	888.7

SOUTH

Softwood:					
Loblolly pine	1,382.2	492.6	766.9	112.8	9.9
Shortleaf pine	372.2	227.9	123.4	20.9	----
Longleaf pine	1,151.3	647.8	481.4	4.4	17.7
Slash pine	1,147.8	550.7	497.7	99.4	----
Other pine	247.9	70.3	153.7	23.9	----
Other softwood	37.1	9.3	10.9	16.9	----
Total	4,338.5	1,998.6	2,034.0	278.3	27.6
Hardwood:					
Red oaks	514.8	97.1	226.6	112.3	78.8
White oaks	224.0	55.1	114.1	54.8	----
Sweetgum	271.1	56.9	164.5	42.9	6.8
Black and tupelo gums	480.0	98.9	286.8	56.1	38.2
Other hardwood	641.6	99.5	375.4	121.4	45.3
Total	2,131.5	407.5	1,167.4	387.5	169.1
All species	6,470.0	2,406.1	3,201.4	665.8	196.7

DELTA

Softwood:					
Loblolly pine	3.6	0.5	3.1	----	----
Shortleaf pine	46.4	22.4	17.9	6.1	----
Other softwood	559.2	35.8	160.7	91.3	271.4
Total	609.2	58.7	181.7	97.4	271.4
Hardwood:					
Red oaks	887.6	92.3	350.2	255.3	189.8
White oaks	595.0	47.1	196.1	166.2	185.6
Sweetgum	601.0	89.3	331.7	110.0	70.0
Black and tupelo gums	211.5	31.8	101.6	78.1	----
Other hardwood	2,008.5	264.0	971.3	551.9	221.3
Total	4,303.6	524.5	1,950.9	1,161.5	666.7
All species	4,912.8	583.2	2,132.6	1,258.9	938.1

[1] Hardwood sawlog volume not tallied in trees under 11.0 inches d. b. h.

TABLE 25.—*Sawlog volume in Mississippi, by species, stand size, and Survey region, 1946–48*

STATE

Species	All stands	Large saw timber	Small saw timber	Cordwood	Seedling and sapling	Restocking and denuded
	Million board feet	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*
Softwood:						
Loblolly pine	5,734.7	1,068.1	4,001.0	596.7	47.2	21.7
Shortleaf pine	2,785.4	376.6	1,816.6	537.9	39.2	15.1
Longleaf pine	1,431.5	130.2	897.3	302.4	45.2	56.4
Slash pine	1,157.2	42.6	813.3	254.3	31.2	15.8
Other pine	454.3	106.6	329.2	18.5	----	----
Other softwood	816.0	263.4	462.9	48.6	23.8	17.3
Total	12,379.1	1,987.5	8,320.3	1,758.4	186.6	126.3
Hardwood:						
Red oaks	4,223.2	1,397.1	1,882.5	803.4	93.4	46.8
White oaks	2,525.8	657.4	1,226.7	563.5	52.8	25.4
Sweetgum	3,112.7	880.7	1,749.9	408.8	64.6	8.7
Black and tupelo gums	1,262.1	299.5	738.0	168.6	37.4	18.6
Other hardwood	5,825.1	1,788.5	2,975.4	818.9	149.6	92.7
Total	16,948.9	5,023.2	8,572.5	2,763.2	397.8	192.2
All species	29,328.0	7,010.7	16,892.8	4,521.6	584.4	318.5

NORTH

Softwood:						
Loblolly pine	284.4	49.5	150.8	81.7	2.0	0.4
Shortleaf pine	748.1	86.3	405.8	235.4	18.5	2.1
Other softwood	75.5	5.8	56.6	12.3	.5	.3
Total	1,108.0	141.6	613.2	329.4	21.0	2.8
Hardwood:						
Red oaks	846.4	192.8	353.6	288.2	11.8	----
White oaks	628.3	106.4	276.4	232.0	8.4	5.1
Sweetgum	524.6	121.2	270.2	126.2	6.7	.3
Black and tupelo gums	83.0	15.8	28.1	33.2	5.1	.8
Other hardwood	741.1	129.6	329.7	233.8	41.1	6.9
Total	2,823.4	565.8	1,258.0	913.4	73.1	13.1
All species	3,931.4	707.4	1,871.2	1,242.8	94.1	15.9

CENTRAL

Softwood:						
Loblolly pine	4,064.5	884.4	2,827.9	306.4	33.3	12.5
Shortleaf pine	1,618.7	253.9	1,121.6	221.8	13.1	8.3
Longleaf pine	280.2	76.4	156.5	38.8	8.1	.4
Slash pine	9.4	----	9.4	----	----	----
Other pine	206.4	80.2	118.6	7.6	----	----
Other softwood	144.2	57.6	83.1	3.2	----	.3
Total	6,323.4	1,352.5	4,317.1	577.8	54.5	21.5

TABLE 25.—*Sawlog volume in Mississippi, by species, stand size, and Survey region, 1946–48*—Continued

CENTRAL—Continued

Species	All stands	Large saw timber	Small saw timber	Cordwood	Seedling and sapling	Restocking and denuded
	Million board feet	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*
Hardwood:						
Red oaks	1,974.4	859.6	873.4	220.5	16.5	4.4
White oaks	1,078.5	362.9	553.7	148.6	10.7	2.6
Sweetgum	1,716.0	550.6	950.5	175.4	34.9	4.6
Black and tupelo gums	487.6	165.3	251.8	62.3	6.1	2.1
Other hardwood	2,433.9	1,083.0	1,119.7	210.3	16.4	4.5
Total	7,690.4	3,021.4	3,749.1	817.1	84.6	18.2
All species	14,013.8	4,373.9	8,066.2	1,394.9	139.1	39.7

SOUTH

Softwood:						
Loblolly pine	1,382.2	134.2	1,020.3	207.0	11.9	8.8
Shortleaf pine	372.2	28.5	258.6	72.8	7.6	4.7
Longleaf pine	1,151.3	53.8	740.8	263.6	37.1	56.0
Slash pine	1,147.8	42.6	803.9	254.3	31.2	15.8
Other pine	247.9	26.4	210.6	10.9	----------	----------
Other softwood	37.1	.2	3.7	16.5	----------	16.7
Total	4,338.5	285.7	3,037.9	825.1	87.8	102.0
Hardwood:						
Red oaks	514.8	84.1	232.5	157.1	16.1	25.0
White oaks	224.0	42.3	99.1	79.4	3.2	----------
Sweetgum	271.1	72.5	145.8	45.7	3.3	3.8
Black and tupelo gums	480.0	32.5	354.9	59.2	21.0	12.4
Other hardwood	641.6	104.9	370.6	128.8	18.6	18.7
Total	2,131.5	336.3	1,202.9	470.2	62.2	59.9
All species	6,470.0	622.0	4,240.8	1,295.3	150.0	161.9

DELTA

Softwood:						
Loblolly pine	3.6	----------	2.0	1.6	----------	----------
Shortleaf pine	46.4	7.9	30.6	7.9	----------	----------
Other softwood	559.2	199.8	319.5	16.6	23.3	----------
Total	609.2	207.7	352.1	26.1	23.3	----------
Hardwood:						
Red oaks	887.6	260.6	423.0	137.6	49.0	17.4
White oaks	595.0	145.8	297.5	103.5	30.5	17.7
Sweetgum	601.0	136.4	383.4	61.5	19.7	----------
Black and tupelo gums	211.5	85.9	103.2	13.9	5.2	3.3
Other hardwood	2,008.5	471.0	1,155.4	246.0	73.5	62.6
Total	4,303.6	1,099.7	2,362.5	562.5	177.9	101.0
All species	4,912.8	1,307.4	2,714.6	588.6	201.2	101.0

TABLE 26.—*Sawlog volume in Mississippi, by class of ownership and species group, 1946–48*

Ownership	All species	Softwood	Hardwood
Private:	*Million board feet*	*Million board feet*	*Million board feet*
Cotton, general, and cotton-vegetable farmer	6,236.1	2,260.8	3,975.3
Other farmer	4,387.5	1,515.3	2,872.2
Businessman, housewife, wage earner, and professional worker	8,470.2	3,290.6	5,179.6
Lumber company	2,899.7	1,447.8	1,451.9
Pulp company	1,430.4	963.3	467.1
Other forest industry	1,099.4	448.2	651.2
Real estate company and land speculator	219.3	76.9	142.4
Miscellaneous	464.5	187.3	277.2
Total private	25,207.1	10,190.2	15,016.9
Public:			
National forest	2,602.8	1,758.1	844.7
County	945.5	175.4	770.1
Other public	572.6	255.4	317.2
Total public	4,120.9	2,188.9	1,932.0
All ownership	29,328.0	12,379.1	16,948.9

TABLE 27.—*Sawlog volume in Mississippi, by class of ownership and stand size, 1946–48*

Ownership	All stands	Saw timber	Cordwood	Other
Private:	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*
Cotton, general, and cotton-vegetable farmer	6,236.1	4,736.8	1,331.4	167.9
Other farmer	4,387.5	3,570.5	629.0	188.0
Businessman, housewife, wage earner, and professional worker	8,470.2	6,681.4	1,493.5	295.3
Lumber company	2,899.7	2,537.2	260.1	102.4
Pulp company	1,430.4	1,284.2	126.8	19.4
Other forest industry	1,099.4	909.8	165.2	24.4
Real estate company and land speculator	219.3	197.7	18.1	3.5
Miscellaneous	464.5	336.7	101.9	25.9
Total private	25,207.1	20,254.3	4,126.0	826.8
Public:				
National forest	2,602.8	2,312.3	250.0	40.5
County	945.5	856.4	62.0	27.1
Other public	572.6	480.5	83.6	8.5
Total public	4,120.9	3,649.2	395.6	76.1
All ownership	29,328.0	23,903.5	4,521.6	902.9

TABLE 28.—*Average sawlog volume per acre in Mississippi, by stand size and forest type, 1946–48*

Forest type	All stands	Large saw timber	Small saw timber	Cordwood	Seedling and sapling	Restocking and denuded
	Board feet	*Board feet*	*Board feet*	*Board feet*	*Board feet*	*Board feet*
Softwood:						
Loblolly-shortleaf pine	2,013	4,266	4,292	659	200	104
Longleaf-slash pine	1,143	5,024	3,977	699	237	95
Cedar	166	----	----	483	167	----
Average	1,742	4,306	4,226	669	212	95
Hardwood:						
Bottom-land hardwood	2,503	4,276	4,384	914	443	883
Upland hardwood	1,497	3,235	2,801	880	245	121
Upland hardwood-pine	1,333	4,872	3,144	574	170	110
Average	1,805	4,168	3,689	735	294	263
All types	1,776	4,207	3,948	706	259	168

TABLE 29.—*Average sawlog volume per acre in Mississippi, by Survey region and forest type, 1946–48*

Forest type	State	North	Central	South	Delta
	Board feet	*Board feet*	*Board feet*	*Board feet*	*Board feet*
Softwood:					
Loblolly-shortleaf pine	2,013	1,021	2,252	2,307	1,219
Longleaf-slash pine	1,143	----	1,773	1,102	----
Cedar	166	(1)	(1)	----	(1)
Average	1,742	1,003	2,223	1,454	969
Hardwood:					
Bottom-land hardwood	2,503	1,591	3,445	2,337	2,456
Upland hardwood	1,497	971	2,457	328	2,663
Upland hardwood-pine	1,333	934	2,013	843	1,518
Average	1,805	1,079	2,478	1,218	2,450
All types	1,776	1,058	2,333	1,363	2,408

[1] Sample too small to permit regional breakdown.

TABLE 30.—*Softwood sawlog volume in Mississippi, by tree quality and Survey region, 1946–48*

Tree quality	State	North	Central	South	Delta
	Million board feet	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*
Grade 1	1,553.8	147.4	992.8	321.0	92.6
Grade 2	3,205.9	281.4	1,770.6	1,002.2	151.7
Grade 3:					
In fair and better stands	2,196.4	57.1	1,174.8	802.1	162.4
In poor stands	5,423.0	622.1	2,385.2	2,213.2	202.5
Total	7,619.4	679.2	3,560.0	3,015.3	364.9
All grades	12,379.1	1,108.0	6,323.4	4,338.5	609.2

TABLE 31.—*Hardwood sawlog volume in Mississippi, by log quality and Survey region, 1946–48*

Log quality	State	North	Central	South	Delta
	Million board feet	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*
Grade 1	1,811.8	248.5	907.5	268.5	387.3
Grade 2	3,888.8	649.4	1,615.0	483.9	1,140.5
Grade 3A:					
In fair and better stands	5,298.9	858.8	2,314.8	641.8	1,483.5
In poor stands	2,867.8	652.0	965.7	408.4	841.7
Total	8,166.7	1,510.8	3,280.5	1,050.2	2,325.2
Grade 3B:					
In fair and better stands	1,811.3	163.6	1,235.5	174.7	237.5
In poor stands	1,270.3	251.1	651.9	154.2	213.1
Total	3,081.6	414.7	1,887.4	328.9	450.6
All grades	16,948.9	2,823.4	7,690.4	2,131.5	4,303.6

TABLE 32.—*Current annual drain on sawlog and total growing stock in Mississippi, by commodity and Survey region, 1946*

STATE

Commodity	Total growing stock			Sawlog growing stock		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet	*Million cubic feet*	*Million cubic feet*	*Million board feet*	*Million board feet*	*Million board feet*
Sawlogs	283.4	163.0	120.4	1,574.9	851.2	723.7
Fuel wood	81.4	11.4	70.0	250.9	44.2	206.7
Pulpwood	79.4	64.2	15.2	126.9	102.8	24.1
Hewn ties	26.2	11.4	14.8	150.5	57.4	93.1
Cooperage bolts	19.2	.5	18.7	124.6	2.8	121.8
Veneer logs	19.1	2.3	16.8	128.0	13.1	114.9
Poles	13.1	13.1	----------	61.6	61.6	----------
Fence posts	5.5	.2	5.3	17.0	.1	16.9
Piling	.6	.6	----------	2.7	2.7	----------
Miscellaneous products	7.7	.2	7.5	40.8	.8	40.0
Miscellaneous domestic use	18.0	2.7	15.3	58.6	5.8	52.8
Total	553.6	269.6	284.0	2,536.5	1,142.5	1,394.0

NORTH

Sawlogs	56.2	26.2	30.0	316.8	136.8	180.0
Fuel wood	28.0	1.2	26.8	83.8	4.8	79.0
Pulpwood	3.6	2.4	1.2	5.8	3.9	1.9
Hewn ties	3.0	.8	2.2	17.6	4.0	13.6
Cooperage bolts	4.8	(1)	4.8	31.3	----------	31.3
Veneer logs	.1	(1)	.1	.8	(1)	.8
Poles	.1	.1	----------	.6	.6	----------
Fence posts	2.0	----------	2.0	6.5	----------	6.5
Miscellaneous products	3.2	(1)	3.2	17.1	(1)	17.1
Miscellaneous domestic use	4.6	1.1	3.5	10.8	1.7	9.1
Total	105.6	31.8	73.8	491.1	151.8	339.3

See footnote at end of table.

TABLE 32.—*Current annual drain on sawlog and total growing stock in Mississippi, by commodity and Survey region, 1946*—Continued

CENTRAL

Commodity	Total growing stock			Sawlog growing stock		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet	*Million cubic feet*	*Million cubic feet*	*Million board feet*	*Million board feet*	*Million board feet*
Sawlogs	161.3	101.3	60.0	890.0	528.9	361.1
Fuel wood	29.6	7.7	21.9	94.4	29.4	65.0
Pulpwood	42.6	35.0	7.6	68.1	56.1	12.0
Hewn ties	14.5	6.4	8.1	83.1	32.0	51.1
Cooperage bolts	7.4	(1)	7.4	48.1	(1)	48.1
Veneer logs	9.4	1.0	8.4	63.4	5.8	57.6
Poles	6.4	6.4		30.2	30.2	
Fence posts	2.1	.1	2.0	6.4	(1)	6.4
Piling	.5	.5		2.3	2.3	
Miscellaneous products	2.5	.1	2.4	13.3	.4	12.9
Miscellaneous domestic use	4.4	.8	3.6	12.8	1.9	10.9
Total	280.7	159.3	121.4	1,312.1	687.0	625.1

SOUTH

Sawlogs	44.7	32.5	12.2	243.2	169.9	73.3
Fuel wood	5.6	1.4	4.2	18.0	5.6	12.4
Pulpwood	30.6	25.9	4.7	48.9	41.4	7.5
Hewn ties	8.6	4.2	4.4	49.0	21.1	27.9
Cooperage bolts	.5	.4	.1	2.8	2.2	.6
Veneer logs	6.4	1.2	5.2	42.2	6.7	35.5
Poles	6.6	6.6		30.8	30.8	
Fence posts	.7	.1	.6	2.0	.1	1.9
Piling	.1	.1		.4	.4	
Miscellaneous products	.7	.1	.6	3.8	.4	3.4
Miscellaneous domestic use	2.1	.8	1.3	5.7	2.2	3.5
Total	106.6	73.3	33.3	446.8	280.8	166.0

DELTA

Sawlogs	21.2	3.0	18.2	124.9	15.6	109.3
Fuel wood	18.2	1.1	17.1	54.7	4.4	50.3
Pulpwood	2.6	.9	1.7	4.1	1.4	2.7
Hewn ties	.1	(1)	.1	.8	.3	.5
Cooperage bolts	6.5	.1	6.4	42.4	.6	41.8
Veneer logs	3.2	.1	3.1	21.6	.6	21.0
Fence posts	.7	(1)	.7	2.1	(1)	2.1
Miscellaneous products	1.3	(1)	1.3	6.6	(1)	6.6
Miscellaneous domestic use	6.9	(1)	6.9	29.3	(1)	29.3
Total	60.7	5.2	55.5	286.5	22.9	263.6

[1] Negligible

955528°—51——6

TABLE 33.—*Current annual drain on sawlog and total growing stock in Mississippi, by species group, 1946*

Species group	Total growing stock	Sawlog growing stock
	Million cubic feet	*Million board feet*
Softwood:		
Pines	267.5	1,132.0
Other	2.1	10.5
Total	269.6	1,142.5
Hardwood:		
Oaks	113.2	520.2
Sweetgum	61.0	309.5
Black and tupelo gums	38.3	215.8
Other	71.5	348.5
Total	284.0	1,394.0
All species	553.6	2,536.5

TABLE 34.—*Current annual drain on sawlog and total growing stock in Mississippi, by Survey region and class of timber, 1946*

Survey region and class of timber	Total growing stock			Sawlog growing stock		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet	*Million cubic feet*	*Million cubic feet*	*Million board feet*	*Million board feet*	*Million board feet*
State:						
Sawlog trees	435.2	218.6	216.6	2,536.5	1,142.5	1,394.0
Cordwood trees	118.4	51.0	67.4			
Total	553.6	269.6	284.0	2,536.5	1,142.5	1,394.0
North:						
Sawlog trees	81.4	28.3	53.1	491.1	151.8	339.3
Cordwood trees	24.2	3.5	20.7			
Total	105.6	31.8	73.8	491.1	151.8	339.3
Central:						
Sawlog trees	227.9	130.9	97.0	1,312.1	687.0	625.1
Cordwood trees	52.8	28.4	24.4			
Total	280.7	159.3	121.4	1,312.1	687.0	625.1
South:						
Sawlog trees	80.7	55.3	25.4	446.8	280.8	166.0
Cordwood trees	25.9	18.0	7.9			
Total	106.6	73.3	33.3	446.8	280.8	166.0
Delta:						
Sawlog trees	45.2	4.1	41.1	286.5	22.9	263.6
Cordwood trees	15.5	1.1	14.4			
Total	60.7	5.2	55.5	286.5	22.9	263.6

TABLE 35.—*Current annual drain on sawlog and total growing stock in Mississippi, by county, 1946*

County	Total growing stock			Sawlog growing stock		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet	*Million cubic feet*	*Million cubic feet*	*Million board feet*	*Million board feet*	*Million board feet*
Adams	11.3	2.4	8.9	63.4	11.2	52.2
Alcorn	3.6	1.0	2.6	16.6	4.9	11.7
Amite	13.4	10.8	2.6	65.9	53.3	12.6
Attala	9.0	4.9	4.1	40.2	19.9	20.3
Benton	2.0	.5	1.5	9.6	2.5	7.1
Bolivar	8.9	(1)	8.9	43.7	.2	43.5
Calhoun	5.0	1.6	3.4	24.4	8.6	15.8
Carroll	4.2	1.8	2.4	19.5	9.0	10.5
Chickasaw	4.0	1.1	2.9	18.4	5.1	13.3
Choctaw	5.6	2.6	3.0	22.9	10.4	12.5
Clairborne	7.5	2.3	5.2	40.8	10.2	30.6
Clarke	15.6	9.5	6.1	78.8	44.9	33.9
Clay	2.3	.5	1.8	10.7	2.2	8.5
Coahoma	3.4	(1)	3.4	15.1	.1	15.0
Copiah	14.3	8.1	6.2	65.7	34.8	30.9
Covington	6.9	4.4	2.5	31.3	18.8	12.5
DeSoto	2.7	.2	2.5	10.4	.3	10.1
Forrest	4.7	3.5	1.2	16.7	12.0	4.7
Franklin	12.0	9.0	3.0	54.5	39.7	14.8
George	4.2	3.3	.9	17.7	13.3	4.4
Greene	6.7	5.1	1.6	30.0	21.3	8.7
Grenada	4.1	1.1	3.0	21.3	5.8	15.5
Hancock	4.4	3.5	.9	15.6	10.8	4.8
Harrison	3.7	3.2	.5	14.7	13.3	1.4
Hinds	9.4	3.7	5.7	42.2	14.6	27.6
Holmes	7.3	1.7	5.6	33.9	5.0	28.9
Humphreys	2.4	(1)	2.4	9.6	.1	9.5
Issaquena	2.1	(1)	2.1	10.6	(1)	10.6
Itawamba	7.0	2.9	4.1	35.8	15.3	20.5
Jackson	6.5	5.2	1.3	23.9	16.0	7.9
Jasper	13.5	7.9	5.6	62.0	32.2	29.8
Jefferson	7.8	3.4	4.4	38.5	14.6	23.9
Jeff Davis	5.8	3.5	2.3	27.4	14.6	12.8
Jones	9.6	5.6	4.0	42.0	22.8	19.2
Kemper	11.2	6.3	4.9	56.0	29.7	26.3
Lafayette	3.5	.8	2.7	16.5	3.8	12.7
Lamar	7.1	5.0	2.1	30.6	19.9	10.7
Lauderdale	14.0	8.1	5.9	68.5	36.7	31.8
Lawrence	9.0	6.1	2.9	40.0	24.6	15.4
Leake	11.6	7.5	4.1	49.6	30.4	19.2
Lee	2.8	.4	2.4	11.1	1.8	9.3
LeFlore	2.6	.1	2.5	10.4	.3	10.1
Lincoln	13.0	8.8	4.2	56.3	36.8	19.5
Lowndes	4.8	1.6	3.2	23.2	7.6	15.6
Madison	7.8	3.1	4.7	37.3	14.4	22.9
Marion	8.2	5.0	3.2	31.6	15.9	15.7
Marshall	3.5	.7	2.8	15.4	3.0	12.4
Monroe	8.2	3.3	4.9	41.2	16.7	24.5
Montgomery	3.5	1.6	1.9	15.7	7.0	8.7
Neshoba	8.4	4.1	4.3	41.3	18.5	22.8
Newton	12.7	7.6	5.1	55.4	30.1	25.3
Noxubee	3.9	1.3	2.6	17.6	5.9	11.7
Oktibbeha	4.2	1.6	2.6	19.0	7.5	11.5
Panola	4.2	.3	3.9	17.7	1.2	16.5
Pearl River	6.0	3.8	2.2	23.6	13.6	10.0
Perry	5.6	3.4	2.2	18.4	9.3	9.1
Pike	9.4	6.1	3.3	39.2	24.3	14.9
Pontotoc	3.4	.9	2.5	15.2	4.6	10.6
Prentiss	4.9	1.3	3.6	24.4	6.5	17.9

See footnote at end of table.

TABLE 35.—*Current annual drain on sawlog and total growing stock in Mississippi, by county, 1946*—Continued

County	Total growing stock			Sawlog growing stock		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet	*Million cubic feet*	*Million cubic feet*	*Million board feet*	*Million board feet*	*Million board feet*
Quitman	1.7	.1	1.6	6.7	.4	6.3
Rankin	16.9	10.0	6.9	71.9	38.0	33.9
Scott	13.1	8.4	4.7	55.8	33.1	22.7
Sharkey	2.6	.1	2.5	13.6	.8	12.8
Simpson	12.5	7.5	5.0	52.6	28.2	24.4
Smith	10.5	5.5	5.0	49.1	24.7	24.4
Stone	3.6	3.1	.5	15.9	13.2	2.7
Sunflower	2.8	(1)	2.8	9.2	.1	9.1
Tallahatchie	2.9	.5	2.4	12.2	2.5	9.7
Tate	1.7	.1	1.6	6.2	.3	5.9
Tippah	3.7	.9	2.8	17.0	4.4	12.6
Tishomingo	5.9	2.1	3.8	27.2	10.1	17.1
Tunica	3.0	.1	2.9	12.9	.7	12.2
Union	3.1	.5	2.6	15.1	2.6	12.5
Walthall	3.8	2.3	1.5	15.5	8.0	7.5
Warren	7.3	1.7	5.6	41.3	8.4	32.9
Washington	4.3	(1)	4.3	16.6	.2	16.4
Wayne	10.8	7.3	3.5	51.9	33.4	18.5
Webster	3.3	1.5	1.8	14.2	6.6	7.6
Wilkinson	14.8	9.4	5.4	74.2	43.9	30.3
Winston	7.1	3.6	3.5	35.3	16.9	18.4
Yalobusha	4.4	.9	3.5	22.4	4.0	18.4
Yazoo	9.4	.9	8.5	50.7	4.1	46.6
Total	553.6	269.6	284.0	2,536.5	1,142.5	1,394.0

[1] Negligible.

TABLE 36.—*Current annual net growth of sawlog and total growing stock in Mississippi, by Survey region and class of timber, 1946–48*

Survey region and class of timber	Total growing stock			Sawlog growing stock		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet	*Million cubic feet*	*Million cubic feet*	*Million board feet*	*Million board feet*	*Million board feet*
State:						
Sawlog trees	256.0	151.5	104.5	1,816.5	901.1	915.4
Cordwood trees	272.7	41.3	231.4			
Total	528.7	192.8	335.9	1,816.5	901.1	915.4
North:						
Sawlog trees	32.0	14.5	17.5	231.2	86.7	144.5
Cordwood trees	73.9	8.4	65.5			
Total	105.9	22.9	83.0	231.2	86.7	144.5
Central:						
Sawlog trees	130.7	84.8	45.9	933.7	504.5	429.2
Cordwood trees	134.9	24.2	110.7			
Total	265.6	109.0	156.6	933.7	504.5	429.2
South:						
Sawlog trees	60.6	49.1	11.5	401.5	292.9	108.6
Cordwood trees	28.6	8.3	20.3			
Total	89.2	57.4	31.8	401.5	292.9	108.6
Delta:						
Sawlog trees	32.7	3.1	29.6	250.1	17.0	233.1
Cordwood trees	35.3	.4	34.9			
Total	68.0	3.5	64.5	250.1	17.0	233.1

TABLE 37.—*Current annual net growth per acre of sawlog and total growing stock in Mississippi, by Survey region and stand-size class, 1946–48*

Survey region and stand-size class	Total growing stock			Sawlog growing stock		
	All types	Softwood types	Hardwood types	All types	Softwood types	Hardwood types
	Cubic feet	*Cubic feet*	*Cubic feet*	*Board feet*	*Board feet*	*Board feet*
State:						
Saw timber	46	58	37	201	251	164
Cordwood	29	32	27	82	104	65
Other	17	14	19	22	25	20
Total	32	36	29	110	132	92
North:						
Saw timber	37	40	36	132	169	120
Cordwood	28	28	28	52	73	44
Other	22	18	24	13	16	12
Total	28	28	29	62	79	56
Central:						
Saw timber	54	66	40	226	270	179
Cordwood	39	43	33	113	130	92
Other	26	23	34	28	31	19
Total	44	49	37	155	172	133
South:						
Saw timber	37	45	23	200	236	133
Cordwood	19	22	13	77	95	46
Other	7	8	7	19	23	13
Total	19	23	13	85	105	52
Delta:						
Saw timber	38	41	38	185	179	185
Cordwood	33	35	32	99	100	99
Other	26	13	26	39	49	38
Total	33	33	33	123	110	123

TABLE 38.—*Lumber production and number of sawmills in Mississippi, by Survey region and size of sawmill,*[1] *1946*

Survey region and size of sawmill (M bd. ft.)	Mills	Lumber production		
		Softwood	Hardwood	Total
	Number	*Million board feet*	*Million board feet*	*Million board feet*
State:				
1–499	1,248	124.2	94.9	219.1
500–2,999	631	442.6	252.9	695.5
3,000 and up	102	289.1	355.2	644.3
Total	1,981	855.9	703.0	1,558.9
North:				
1–499	516	47.0	51.5	98.5
500–2,999	178	71.2	74.6	145.8
3,000 and up	12	14.9	50.1	65.0
Total	706	133.1	176.2	309.3
Central:				
1–499	380	49.8	26.4	76.2
500–2,999	339	277.6	141.1	418.7
3,000 and up	53	203.1	161.6	364.7
Total	772	530.5	329.1	859.6
South:				
1–499	195	22.7	7.2	29.9
500–2,999	100	88.4	29.9	118.3
3,000 and up	20	61.0	39.6	100.6
Total	315	172.1	76.7	248.8
Delta:				
1–499	157	4.7	9.8	14.5
500–2,999	14	5.4	7.3	12.7
3,000 and up	17	10.1	103.9	114.0
Total	188	20.2	121.0	141.2

[1] As measured by production of lumber in 1946.

U. S. GOVERNMENT PRINTING OFFICE: 1951